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CONTENTS

THE increased interest of the public in railway affairs is all the time bringing up new problems, some of them puzzling. With our former mild or half dead railway commissions a profound quiet reigned—reigned too, completely—where now things are stirring constantly. The Public Service Commission of New York, when it set up its office in New York City, established its office hours as from 8 a. m. to 11 p. m., almost like a weather observer or a telephone exchange, the idea apparently being that the virtues of the new public body as a cure for all transportation ills should be constantly on tap. The Indiana commission, a few months ago, on the occasion of a holiday, when extra heavy travel was expected on the trolley roads, sat in its office all day, early and late, with its ear to the telephone in expectation of a report of a collision. At least this is the impression we got. On the occasion of the wreck last week at Manchester, N. Y., Chairman Clements of the Interstate Commerce Commission, according to the newspapers, ordered an inspector to start for the scene of the accident "instantly." (How the honorable chairman could justify to the auditor of the treasury department the expense of a special train or an aeroplane, is a mystery.) The instantaneousness of the start would not have much meaning after making the journey of 300 miles to Manchester, but the incident illustrates the temper of the public. But while the public cannot learn much more about a broken rail in the first hour after the accident than it could a week later, the derailment at Middletown, Conn., shows the need of even greater alacrity than any that has yet been manifested—unless railway officers can be trusted. And this brings us to the serious part of these comments. At Middletown a train carrying 400 passengers home from the seashore was thrown down a bank and 60 passengers were injured; and the superintendent of the road, offering a reward of $2,500 for the miscreant, declared that a rail had been maliciously loosened, all the spikes of one rail having been pulled on both sides of the rail, and the splice bars taken off. The spikes, undamaged by derailed wheels, were lying on the ground nearby. But the next day a chief of police and a sheriff arose to say that there was no evidence of malicious tampering with the track. They thought the roadbed had been softened by rain and that the heavy engine had spread the rails. They classed the engine as "heavy," because the train was a long one. Surely the public desires to know when train wreckers are abroad; and it would seem that an experienced railway officer ought to be able to diagnose the facts of a wreck more accurately than a sheriff.

THE train rules of the railways of Great Britain, which originally were written by masters of language and which have been the subject of careful modification and improvement for many years, ought to constitute one of the most complete and carefully matched documents of the kind to be found; and, indeed, they have that appearance. Thoroughness and a careful attention to every little element of the trainmen's work, and of the construction of language to fit the trainman's mind, appear on every page. But Colonel Yorke, senior inspecting officer of the Board of Trade, has discovered a place where the English code is deficient, while that of the American Railway Association is all right. It is the requirement that a signalman shall put a signal to the stop position immediately after the passage of a train. In our code the clause is a part of rule No. 319: "When a train . . . has passed the home block signal and the signalman has seen the markers, he must display the stop signal . . . ." The obvious requirement is found in the British code only in relation to distant signals. So far as home signals are concerned it has to be implied. But then, it is very clearly implied, and of course the practice is substantially universal. So, in the case under discussion, which was that of a collision on the London & North Western, near Liverpool, the signalman is held responsible for allowing a second train to proceed towards his station before he had restored the signal to its normal position behind the preceding one. The government officer con-

cludes that the signalman received the offer of the second train just as he had given notice of the exit of the leading train and that, to save time, he accepted the second train at once, intending to put the signal to the stop position immediately afterwards; but that he forgot to do so. The error was not, however, a simple act of forgetfulness, for in other respects he failed to perform his duties in their proper sequence. To the American the remarkable thing is that the English manual signalmen, with no control apparatus except the ocular control afforded by their needle instruments, perform their millions of operations with so few serious errors.

THIS report affords another instance illustrating how the British inspectors have come to look with favor on the track circuit; but Colonel Yorke, while clearly setting forth that the use of track circuits would be a great safeguard against errors by signalmen where switching is going on within their territory while passenger trains are due, takes advantage of the occasion to make a little suggestion to the signalmen, as follows:

"The best way in which errors of this sort can be guarded against is by the introduction of the track circuit combined with automatic or semi-automatic signals. But to introduce this method of signalling upon English railways would involve the expenditure of a very large sum of money, and would take a considerable time to carry out. Supposing this were done, the natural result would be to cause a large decrease in the number of signalmen employed, and to lessen the responsibilities and status of those remaining. If everything were made "fool-proof," men of skill and intelligence would no longer be required for manning our railways. Signalmen would be well advised to show, by loyal and intelligent adherence to the rules and regulations (each one of which is based upon experience), that they can give as good results in the handling of traffic with safety as is claimed for automatic signalling."

That is good advice for the signalmen, for intelligent adherence to the rules, like virtue generally, is its own reward. But when they match themselves against automatic signals they have taken a large contract. A certain American road, in a rough comparison made a few years ago, found that, according to the record of the number of failures occurring in proportion to the number of signal movements made, automatic block signals gave one false clear indication in proportion to *thirty-five* given by men handling manual signals.

WHILE the Canadian Pacific, through its land department, has placarded the statement that reciprocity with the United States will increase the value of Canada lands 100 per cent., this is apparently almost the only appearance of a railway question or interest in the fervid political campaign over the border now drawing near to its voting days. We have seen no reference to the subject in the reports of the vehement speeches of the party orators of Canada. Yet it was at the last session of the Canadian House of Commons that on what was a kind of railway field day, Mr. Borden, Conservative leader of the opposition, attacked the government's railway methods in connection with the building of the Grand Trunk Pacific most savagely, charging fraud or mismanagement at many points; and it looked then, before the reciprocity agreement had materialized at Washington, as though the Dominion government's alleged railway lapses might be the foremost issue in the next general election. But the attack was on the details of the government's policy, not on the policy itself. Canada gave the Canadian Pacific more than $25,000,000 in money subsidies, besides 25,000,000 acres of land; and to the Grand Trunk Pacific in its advances and guarantees its generosity has been similarly lavish, with the prosperity of the Canadian Pacific as a stimulating precedent. Both parties are committed to state aid of the Grand Trunk Pacific, and the government, whether Liberal or Conservative, has already gone too far to shift or materially modify the state aid policy. This basic fact presumably goes far to exclude the railway issue, and even in the maritime provinces, reported recently as opposed to the Grand Trunk's New England extension, the question seems dormant as contrasted with a naval policy and the ghost of "annexation." From a different, if not wider viewpoint, it is to be noticed that all accounts agree that the Canadian farmers are turning to reciprocity, not only in the western prairie provinces, but in Ontario and Quebec. As it is mainly among the western Canadian farmers that the two great railway systems of the country have their profitable development, it is not strange that the major railway influence is thrown on the reciprocity side, as has been the case in this country in our states, which are adjacent to the northern boundary line.

BOILER CIRCULATION.

THE discussion on water leg circulation at the Master Boiler Maker's convention, particularly as applied to the Jacobs-Shupert firebox, attracted considerable attention, and, as a partial result, we publish in this issue an account of some tests that were made to determine the relative circulation in a Jacobs-Shupert and an ordinary firebox. The investigation may be accepted as showing that there was an upward circulation in both boilers, which few people are prepared to deny, but to most readers it is doubtful if it is accepted as proving much more.

The test was made by taking samples of the water from various heights along the water leg and judging from the amount of contained solid matter as to the velocity of the currents. The greater the excess of solid matter at the top over that at the bottom the more rapid the circulation was supposed to be.

The inference drawn, for example, that, because on trip 16 "there was no undue amount of solids at the bottom of the water leg . . . . there is a very complete circulation around the water leg," may or may not be accepted. It depends on the viewpoint.

What are the currents in a water leg? Are they all upward? Some guess not and think that possibly there may be a downward flow next the outer sheet. If that guess is correct then an accumulation of solid matter near the surface would indicate sluggishness in the circulation, which would permit of such an accumulation.

There is but one set of tests that seem, from the notes, to indicate similar conditions in the Jacobs-Shupert and the ordinary firebox and that is on runs 11 and 23, after standing 30 minutes at Kingman. From this, according to the scale of suspended matter and accepting the theory proposed, the circulation in the ordinary boiler was far the better of the two.

The investigation is interesting and of value, but we know so very, very little about boiler circulation and what it means in the generation of steam that it is decidedly unsafe to draw any generalizations from such meagre data as that which is presented here.

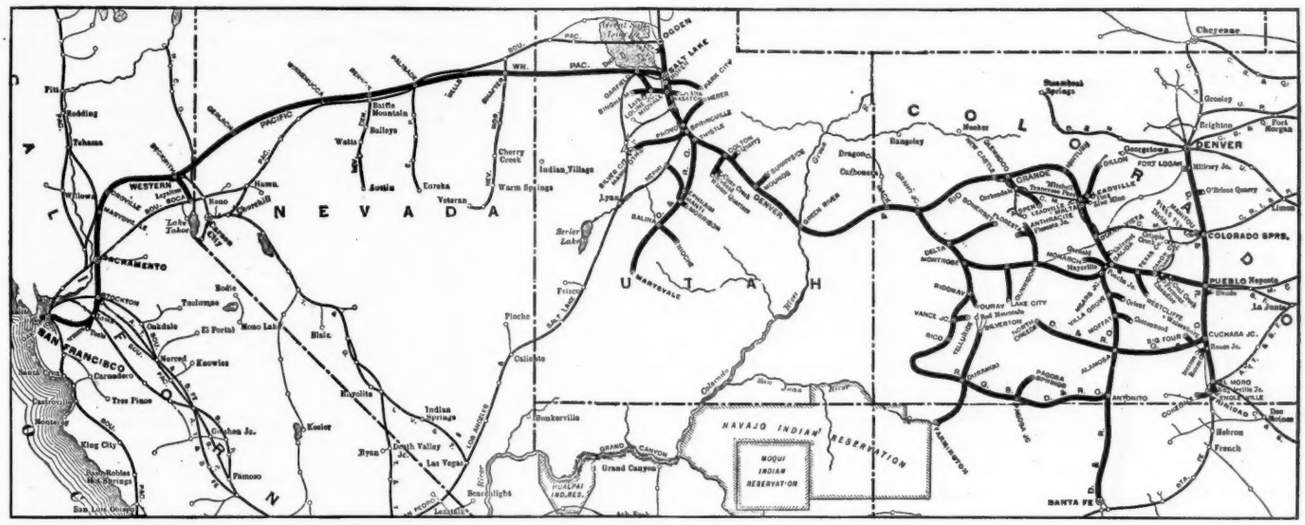
That there is an upward circulation in the water leg, there can be no doubt, but as to its rapidity, actual direction and complication of counter currents we know about as little as can be imagined. The one thing promising is that there is a prospect of its being actually measured in the near future, and then we may be able to design fireboxes with some idea of what actually goes on within them.

One final point regarding the article referred to in which a claim of a greater efficiency for the Jacobs-Shupert firebox is made. Road tests are said to show "an increase in evaporated efficiency per square foot of heating surface per hour of 35 per cent." As no definition is given as to what is meant by evaporative efficiency in this case, and as there is no data at hand as to the conditions of the test, such as pounds of coal burned, and the work done, the subject is not in a condition to be discussed. But 35 per cent. increase of boiler efficiency is a good deal, and should be of vital interest and importance to every railway manager in the world, and the hope and trust of every sincere friend of railway progress must be that it is true.

DENVER & RIO GRANDE.

THERE was one question that was asked repeatedly of the various witnesses before the Hadley Securities Commission in connection with the general investigation of the advisability of federal regulation of the issuance of railway securities. The question, worded in various ways, amounted to an inquiry as to what a company should do when, through former overissuance of securities, bad judgment, or simply some unforeseen natural causes, it found itself in need of raising large sums of money to put its property in condition to handle an increased business profitably, the company having already issued a stock to, let us say, 75 per cent. of its present value, and bonds to an equal amount. The showing of the Denver & Rio Grande from year to year is a good illustration of how real this difficulty is to certain railway companies. This is especially the case now that the Western Pacific has been completed and is in operation; and the problem is made more nearly vital by the recent decision of the Interstate Commerce Commission which reduced materially rates to intermountain territory, which reductions, it is thought, will bear heavily on the Denver & Rio Grande.

This road has two quite distinct kinds of business. One is a large volume of local business originating through the great



The Denver & Rio Grande and the Western Pacific.

natural resources of Colorado, and in the transacting of which business the D. & R. G. is largely without a competitor. Such business, for instance, is the transportation of precious ore and, to a less extent, of bituminous coal, as well as the transportation of products of agriculture. The other form of business is that which probably prompted the building of the Western Pacific. The D. & R. G. now forms the connecting link between the Missouri Pacific at Pueblo, Colo., and the Western Pacific at Salt Lake City, Utah. To handle through business the Denver & Rio Grande has got to compete directly with the Union Pacific; and regardless of whether or not the Western Pacific is as well built and can be as economically operated as its competitor, the Southern Pacific, between Salt Lake City and the Pacific coast, the D. & R. G. itself has got to be able to handle its through business in such a way as to make a favorable comparison with the Union Pacific. Otherwise the Gould system of roads cannot successfully compete for through traffic, on the theory that a chain is no stronger than its weakest link.

In the fiscal year ended June 30, 1911, the Denver & Rio Grande earned $23,400,000 gross, as compared with $23,600,000 in the previous year. Operating expenses amounted to $15,960,000 last year and to $15,800,000 the year before; so that, after the payment of taxes and clearing outside operations, operating income amounted last year to $6,550,000 as against $6,956,000. The company paid its fixed charges and annual dividends of 5 per cent. on the preferred stock in 1910, but after the payment of 2½ per cent. on the preferred in the first half of the past year, the second semi-annual payment on the preferred was passed, so that in 1911 the company had a surplus of $1,118,000 as against a surplus of $399,000 in 1910. But President Jeffrey, in his annual report, says that $1,248,000 semi-annual interest, due September 1, 1911, on the $50,000,000 Western Pacific first mortgage 5 per cent. bonds, will have to be paid by the D. & R. G.; thus actually, instead of a surplus the company will have a small deficit.

The Western Pacific has been in operation, or at least has published through tariffs, since 1910, but up to June of this year the results were a disappointment. There had been floods in the Humboldt valley and a series of storms on Great Salt Lake which had seriously interfered with traffic; and again early in January, 1911, rains in the mountain districts in California caused frequent slides in the deep cuts and the settling of some of the heavy embankments, so that during a good part of the winter and early spring train movement was uncertain. Beginning with the month of July, the Western Pacific is to make public its earnings, and the Denver & Rio Grande estimates that these earnings for July will be about $420,000. If the road did not earn more than this per month it would have to operate at something better than 50 per cent. ratio to pay 5 per cent. on its $73,000,000 cost of construction.

However, as has already been mentioned, it is the problem of the Denver & Rio Grande itself, rather than that of the Western Pacific, that lends especial interest to the report of the company for 1911. Any one who has been over the road knows that it has heavy grades, high degrees of curvature and is not in physical condition to compare favorably with the Union Pacific. The territory is difficult. When the road was built, theories of construction had a quite different trend than they now have, and the quality of maintenance of the property in the past has, possibly necessarily, not allowed of rebuilding the line out of earnings, as has been done with so many parts of other roads originally built cheaply or with low standards of construction. Whatever the causes, however, and how little the officers who are now operating the road are to blame, the fact remains that it would require an expenditure of very many millions of dollars to put the road in shape to compare favorably with its transcontinental competitor; and apparently the D. & R. G. simply has not got the money to spend—at least at present. In 1908 a first and refunding mortgage was placed on the entire property, the old Rio Grande Western being included under this mortgage, and since that time, $33,944,000 of 5 per cent. bonds secured by this mortgage have been sold; but, of course, it is necessary to provide for the outstanding $79,667,000 underlying bonds, and the

price at which D. & R. G. securities are selling would hardly make it probable that a new large issue of refunding 5's could be successfully sold at a profitable figure.

What is meant by the policy of the company towards its maintenance, may be explained by an examination of the details of the expense account in 1911. The Denver & Rio Grande last year operated on a 68 per cent. basis; the Union Pacific operated on a 52 per cent. basis in 1910, the 1911 report not being available yet. It cannot be said that the class of commodities carried, unfavorably affects the operating ratio of the D. & R. G., because the Union Pacific's revenue per ton per mile was 1.02 cents and the Denver & Rio Grande's average revenue was 1.24 cents. As a whole, the operating expenses in 1911 on the Denver & Rio Grande amounted to $15,960,000, as against $15,800,000 in 1910; maintenance of way costing slightly less and transportation also costing less in 1911 than in 1910, while maintenance of equipment, traffic and general expenses cost more in 1911 than in 1910. The increase in cost of maintenance of equipment can be accounted for almost entirely by a charge for depreciation, made for the first time this year. Figured on a per road mile or per track mile base, the expenditures for maintenance of way and structures were fairly large, but it must be remembered that the D. & R. G. runs through territory which makes it unusually expensive to keep the line open at all in certain seasons of the year, and it is instructive to pick out certain items that can be fairly accurately compared as between different roads and see what the D. & R. G. is doing when measured against its competitors* for through traffic.

Taking the item bridges, trestles and culverts, the cost of maintenance per year per *road* mile is $85 on the D. & R. G., and $66 on the Union Pacific. This is because the D. & R. G. has a great many more bridges and trestles to maintain per mile than the Union Pacific, and also probably because the Union Pacific's bridges are of more modern construction or approved standard than the structures on the D. & R. G. Roadway and track is an item largely made up of labor costs; that is, the cost of placing materials in track, etc. On this account the Denver & Rio Grande spent $424 per *track* mile; the Union Pacific spent $611 per mile. The D. & R. G. spent $231 per track mile for ties; the Union Pacific, $263. But when we come to rails and ballast the contrast is striking. The Union Pacific spent $84 per track mile for rails; the D. & R. G., $22. The Union Pacific spent $12 per mile for ballast; the D. & R. G., $2.80.

What all this suggests is that possibly the future of the Denver & Rio Grande lies not in developing its through traffic, for which it cannot compete with the more favorably situated and financed Union Pacific, but in which it can earn from the local traffic that it can control and for which traffic it has not and probably never will have, a competitor.

The annual report of the company gives a table showing the various classes of traffic and the revenue derived from each class of traffic which is unusually full and instructive, and the frankness of these figures and, as far as that is concerned, of all the figures given in the annual report, is to be strongly commended.

The following table is an abstract of this classification of freight tonnage and revenue:

	1910-11.		1909-10.	
	Per cent. of total tonnage.	Per cent. of total revenue.	Per cent. of total tonnage.	Per cent. of total revenue.
Products of agriculture..	3.86	9.17	3.60	7.87
Products of animals.....	1.07	4.19	1.14	4.20
Products of mines.....	84.24	51.17	84.29	51.92
Products of forests.....	2.21	4.04	2.33	4.28
Manufactures	5.54	13.88	5.54	14.97
Miscellaneous	1.62	4.97	1.68	4.71
Merchandise	1.46	12.58	1.42	12.05

*It is necessary to take the 1910 figures for the Union Pacific, as previously explained, because later figures are not yet available, but the differences between the two roads are so great that the comparatively small fluctuations from year to year do not impair the value of the comparison.

The following table shows the results of operation in 1911, compared with 1910:

	1911.	1910.
Mileage operated	2,597	2,598
Freight revenue	$17,241,018	$17,306,613
Passenger revenue	5,124,383	5,275,895
Total operating revenue.....	23,391,771	23,563,437
Maintenance of way and structures	2,627,895	2,690,602
Maintenance of equipment.....	4,119,189	3,804,120
Traffic	587,083	511,108
Transportation	8,028,628	8,234,207
Total operating expenses.....	15,957,737	15,801,954
Taxes	859,621	823,515
Operating income	6,546,813	6,955,952
Gross corporate income.....	8,396,219	8,493,823
Net corporate income.....	2,483,044	3,008,167
Dividends	1,244,495	2,488,990
Renewal fund	120,000	120,000
*Surplus	1,118,549	399,177

*As explained in our comments, $1,248,125 was advanced by the D. & R. G. to the Western Pacific to pay its semi-annual interest on $50,000,000 first mortgage bonds.

WESTERN SHOP EMPLOYEES.

THE signs are that the leaders of the shop employees of western railways realize they have committed a serious error in making and pressing unreasonable demands at such a time as the present. The heads of the railway labor organizations have acquired the reputation of extremely good strategists. They have repeatedly out-generaled the railway managers. The leaders of the shop organizations have this time been completely out-generaled by the managers; and the emphatic course they have taken indicates that they got drunk with power and lost their heads. To have merely demanded at this time recognition of a federation which, as Mr. Kruttschnitt has pointed out, would have the power to declare a strike in all the shops of the Harriman Lines, and cause trouble and loss to all of the twenty millions of people that those lines serve, would have been going to great length. "Whom the gods would destroy they first make mad"; the labor leaders did not merely seek recognition of the federation, but also formulated a large number of grotesquely unreasonable demands which they intended to press as soon as the federation was recognized. The result has been that all the railway managements which originally refused to recognize the federation have "stood pat"; the public has backed them in doing so; in some places, as Houston, Tex., Omaha, Neb., and Denver, Colo.; commercial organizations have adopted resolutions condemning the stand of the employees and commending that of the managers; many of the employees are now manifesting a reluctance to go to the extreme of a strike; and the union leaders are seeking vainly for a loophole through which they can escape without irreparable loss of prestige from the untenable position they so cheerfully took up.

One rather important reason why many employees do not want to strike is afforded by the pension systems of the railways concerned. The Harriman Lines, for example, now have 722 pensioners to whom payments aggregating $258,588.33 were made in the fiscal year ended June 30, 1911. This is an average of over $358 per pensioner, which at 5 per cent., would be the interest on $7,160. In other words, at his retirement from the service the road practically gave to each of these employees the income from $7,160 for the rest of his life. It will do the same by other employees who remain continuously in its service for the periods specified in its pension plan. Every employee who struck would lose his pension rights. But the consideration most influential with a large number of employees is the great probability that a strike declared now would be unsuccessful, which would put it in the power of the companies to make material changes in wages and conditions of employment. It is not at all sure that there will not yet be a strike on one or more roads, but it is significant that for the first time in years the railway managers directly concerned are regarding the situation with more complacency than the labor leaders.

NEW BOOKS.

Fuel Oil Specifications. By Irving C. Allen. Published by the Department of the Interior, Bureau of Mines, Washington, D. C.

This pamphlet, listed as technical paper No. 3, gives specifications for the purchasing of fuel oil and the methods of sampling. It is issued for use by the government, but may be of general use to anyone dealing with fuel oil. It contains a method of finding the price to be paid for different oils, on the basis of the number of B. t. u.'s per lb. Methods for sampling natural gas from wells are also considered in detail.

Taxation of Corporations, Part III; a special report of the Commissioner of Corporations, Washington, D. C. 109 pages.

This pamphlet contains the results of a study, made by the commissioner, of the methods of taxation of corporations in Ohio, Indiana, Illinois, Michigan and Wisconsin. The work deals with manufacturing, mercantile, transportation and transmission corporations. There is a general view of the system in each state; a statement of details, with a summary of the law as it is found in the constitutions and statutes; court decisions and a summary of the financial results. A brief introduction tells the peculiarities of each state as compared with methods in force in other states. Part I of this series, dealing with the New England states, was issued in May, 1909; and Part II, Middle Atlantic states, in June, 1910.

Railroad Correspondence File. By W. H. Williams, third vice president of the Delaware & Hudson Company. Published by the author, 32 Nassau street, New York City; half leather; 230 pages; 7 in. x 9¾ in. Price $7.50.

This is a plan for filing letters in a large office, strictly according to subjects, an arbitrary number being assigned to each subject, the plan followed being that of the Dewey decimal system, used everywhere in large libraries, but here adapted, not to all the information in the world, but only to that dealt with in railway offices. Mr. Williams issued the first edition of his work nine years ago, when he was on the Baltimore & Ohio, and a notice of it was given in the *Railroad Gazette,* January 2, 1903. He not only has had extensive experience on a number of important roads, but, at the instance of Mr. Loree, who was president of the Baltimore & Ohio in 1902, he also examined the methods of filing in use in all sorts of offices, both in America and Europe. Since the first edition was issued, the Pennsylvania Railroad has had a committee investigate the general subject of filing, and that committee, of which J. L. Hanna was chairman, has given Mr. Williams about 1,000 additional titles; and the new book is enriched to that extent. As now revised, the book is used as standard on the Pennsylvania Railroad; and it is in use generally on the Harriman Lines. It is also in use on the Delaware & Hudson, the Baltimore & Ohio, the Chicago, Burlington & Quincy, the Lehigh Valley and the Canadian Pacific.

The ten primary numbers are assigned to the different departments of railway business as follows: 0 General; 1 Executive and Legal; 2 Finance and Accounts; 3 Roadway and Structures; 4 Equipment and Shops; 5 Transportation and Storage; 6 Traffic, Rates; 7 and 8 Spare; 9 Local Facilities and Affairs. To illustrate the arrangement we may take the sub-divisions of section 5, which are as follows: 510 Tracks and Terminals-Working; 520 Trains; 530 Locomotives—Utilization of; 540 Cars—Utilization of; 550 Spare; 560 Safety Measures—Signals; 570 Telegraph and Telephones; 580 Accidents. Under 540, we find for example, 541.1 Supply of passenger cars; 541.11 Orders for; 541.111 Orders for coaches. Again, 541.4 Dining-car service; 541.41 Meals; 541.414 Complaints of passengers. The last item under Dining-cars reads "Supplies—see 027.1." This reference back to a number under the head of Conducting Transportation is an example of the careful manner in which a variety of necessary or desirable cross-references have been introduced throughout the book. The complete adaptability of the system is again illustrated in the treatment of the last general subject, "Local Facilities." Here the author breaks away from the principle of indexing by subjects and follows a geographical plan. Correspondence relating to local matters in any one town or city is likely to combine two or more subjects, and in some cases of extensive track elevation a dozen subjects might arise, all of which it is desirable to keep together. Numbers from 900 to 906 are assigned to correspondence on Local affairs off the line; for example, South America 900.4; Massachusetts 901.4; Wisconsin 904.5.

The last half of the book consists of an alphabetical list of subjects, the relative importance of each being indicated by indentation in the setting of the type or by the use of fullface type.

Any office manager who has enough letters to render a simple alphabetical classification by names of writers insufficient for his needs will find it necessary to classify by subjects; that is to say, classification by subjects is his only resource. This conclusion seems to be concurred in by an overwhelming majority of those who have investigated the subject; and for a railway, with its hundreds of large stations and scores of other offices, a subject classification is peculiarly appropriate, as the same classification can be used in all stations and offices. The Dewey decimal system is so simple and is susceptible to such indefinite expansion by any user, that it meets all objections. When any new topic arises it is always closely related to some existing head, and combining it with the nearest head by adding a decimal place makes abundant room for the new comer. The system is thus capable of unlimited expansion, and can never break down for lack of room for growth. Not only are all papers sought bound together, but the most nearly allied subjects precede and follow.

Not the least significant feature of the commendatory testimony given by users of the Williams classification is that regarding the abolition of every thing in the nature of accessories. With the vertical flat filing system there are necessary only three units; the book, the filing case and the storage file, the latter for papers over a year old. No "record of correspondence" need be kept and letters sent out do not need to bear either a file number or any request to the recipient to refer to some number or letter in his reply.

Mill Buildings. By Henry Grattan Tyrrell, C. E. 6 in. x 9 in. 490 pages. 652 illustrations. Myron C. Clark Publishing Company, Chicago. Price, $4.00.

Henry G. Tyrrell, C. E., who was the author of a little book on Mill Building Construction, published in 1900, greatly enlarges the scope of this work in his book on the Design and Construction of Mill Buildings. This work is not limited to the calculation of stresses in steel frame buildings, but covers very completely the economics of location, the general and detailed design of such buildings, including a great many details of walls, floors, windows, doors and roofs. Chapters are included on loading and the calculation of stresses, but elementary discussions of graphic statics and stress calculation are eliminated on the assumption that a student of this subject is already thoroughly familiar with the elementary principles of structural design.

A feature of the book is the part devoted to the engineering and drafting departments of structural works, giving the organization of such departments, methods of procedure in estimating and designing and the organization and management of a drafting room. A great deal of the material in the volume is based on the personal experience of the writer, which covers a period of 20 years in designing and estimating structural work, and a great many of the estimates on prices and qualities are taken from his personal note book. This removes the work from the class of purely theoretical and academic volumes on designing, although the parts intended for students and draftsmen are sufficiently simple and elementary to permit them to be readily understood.

The railway development in Chile for the next few years contemplates the construction of two new trans-Andine railways to connect the railway systems of the Argentine with the Chilean railways; one of these to be about 300 miles north of the present trans-Andine and the other about 400 miles south. The north line will put the agricultural sections of the Argentine in close touch with the nitrate fields of Chile, to the great advantage of both.

Letters to the Editor.

CARELESS ENGINEMEN.

To the Editor of the Railway Age Gazette:

You have discussed the importance of knowing that enginemen are in a fit condition to exercise, and do exercise, the vigilance necessary for the protection of life and property. This is solely a matter of supervision and discipline. The time has gone by when a railway man's work can be improved upon by lectures or pleading, or calling attention to other's shortcomings. He must know that he is being watched and that if caught he will be punished. No better means of improving work has ever been devised than the surprise test and it is a great pity that the labor organizations have been successful in their efforts to knock it out on most of the large systems.

It corrects the tendency of enginemen to be careless in observing signals. If a runner knows that some one is going to display stop signals at unexpected places, extinguish lights in train order or block signals, and make other surprise tests with a view of finding out who are incompetent or careless he surely "takes notice." This, followed up with good stiff discipline for the delinquents effects genuine improvement.

A long association with locomotive enginemen has convinced me that the most dangerous yet the least considered fault of an engineman is that of "visiting" in the cab. In talking with another he not only draws the attention of that other, but his own face is turned to the left side, while he tells stories or relates his woes. Then we have the nodding engineman who is in the habit of dropping asleep between stations no matter how much rest he may have had. There are more of these men running engines than the general public has any idea of. The firemen can tell who they are if they will. Then there are the drinking and the reckless men. These, it is comparatively easy to detect, but to get at the first mentioned species it is absolutely necessary to have a system of surprise tests. Observation tests alone do not fill the bill at all.

RASTUS.

FOR BETTER SEAL RECORDS.

To the Editor of the Railway Age Gazette:

At the meeting of the Freight Claim Agents' Association in St. Paul, last June, as reported in the *Railway Age Gazette*, July 14, Mr. Tustin, freight claim agent of the Missouri Pacific, made mention of the amazing fact that the railways had paid out $30,000,000 in settlement of claims for loss and damage to freight in one year.

There are several causes that contribute to bring about this shameful waste, but to be brief, I will confine my remarks to pilfering. Chief among the causes is the use of cars for transporting valuable freight, that are worn out and unfit for the purpose; cars with doors and fastenings faulty; unreliable seals and seal records; and general lack of interest on the part of line officers in investigating claims.

When cars become unfit for valuable freight, by reason of doors and fastenings becoming worn and damaged, they should be assigned to less important traffic.

Most any tramp, if given thirty minutes and a monkey wrench, can gain entrance to most cars by simply taking the nuts off of a few bolts, or unscrewing a few lag screws without breaking the seals. This could easily be remedied without increasing the cost of cars, by any mechanical man.

Adopt a seal that cannot be worked without leaving visible signs of having been tampered with; then keep a correct and reliable record of the seals. With seals numbered consecutively and running into the ten thousands, it is out of the question for conductors to take the numbers and enter them in the train books furnished for that purpose, in the time allowed at the initial stations, and they should be relieved of this. Instead give them a list showing the cars in the train with complete seal record of each car noted thereon. The conductor should be required to certify that the cars were all sealed intact and to deliver the certificate with his train at the end of the run Have reliable seal clerks at all freight terminals whose duty it shall be to take the seals immediately on arrival and compare with the forwarding agent's record. If any seal has been tampered with or the number does not tally with the forwarding agent's record, send the car to freight house to be checked. Ascertain the shortage, if any, and give the information to the train master by wire, who in turn will call on the conductor for an explanation. Make sufficient surprise tests to insure accurate checks at all terminals. Let the men know that the responsibility for loss of freight and for broken or improper seals, will be placed where it belongs and at the time it occurs, not three to six months after. Then they will give the trains more protection and stop some of the loss.

J. O. KELLY.

PUBLICITY.

Newton, Kan., August 19, 1911.

To the Editor of the Railway Age Gazette:

Publicity is, no doubt, one of the best remedies, or preventives, for evil or wrong doing, and the free press and free speech are as much a necessity to discourage crime as our army and navy are to maintain peace, or discourage war. And the indiscriminate use or abuse of the free press or speech would prove almost as disastrous to our business interests as would the use of the army to settle every little town row or labor dispute.

While there is, perhaps, no necessity for a government censorship, considering the fact that the press is advocating government regulation of nearly everything else, would a little regulation of the press be out of order? And would it not be a good thing for the country, especially when the extreme use of the press causes a greater loss than gain?

The country editor who happened to learn that the cashier of the town's bank was living beyond his salary, and would publish the fact in such a manner as to cause a run on the bank, might not be exceeding his legal rights, but he would be using mighty poor judgment, so far as the interests of the bank and community at large were concerned. His action would cause a greater loss than gain.

If any of our public men should go over the country denouncing our home banks, declaring their managers robbers and the banks unsafe, his free speech would be likely to be cut off by an angry mob. He would at least be condemned for an attempt to destroy confidence in an institution where it was most needed for the town's welfare or business interests. Why then should these same men be permitted to declare our large corporations a menace to public welfare and their managers robbers, when the very foundation of our prosperity and progress depends upon confidence in our large corporations, or combined capital?

When a well known insurgent congressman gave out a two column interview a short time ago telling of the faults and bad practices of the express companies, doubting their legal right to do business, and referring to them as doing business as "blithe as any pirate that ever scuttled a ship or cut a throat," he did not confer a public benefit or offer any way of regulating the express companies, but he did advertise one already well known congressman at the expense of increasing the lack of public confidence in our corporations in general.

The express companies, perhaps, need regulating, and the record of the congressman referred to would indicate that he is capable of assisting in their regulation. But would it not be more becoming a man in such a position to refrain from shouting "fire" just because he smelled smoke? Could he not go ahead, discover the fire, extinguish it, and permit the public to do the shouting? Is it necessary to stampede the public against our corporations in order to reform or regulate them?

The extremes of even the good things of this world are dangerous, and there are no reasons for the belief that free press and free speech are exceptions.

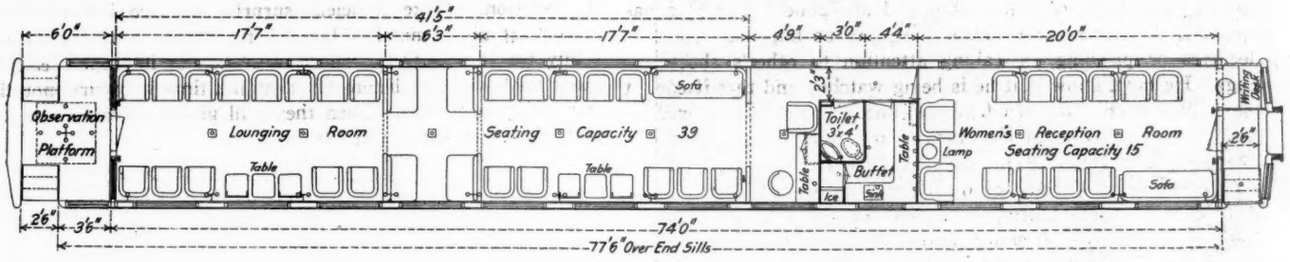
A. J. EWING.

WOMEN'S PARLOR CAR FOR THE BURLINGTON.

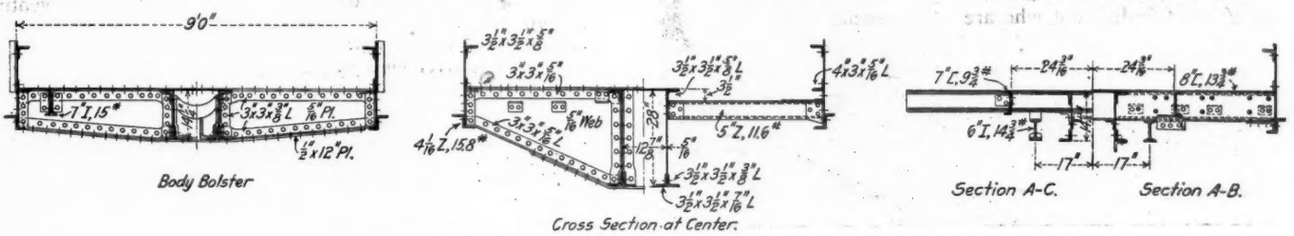
The passenger service between Chicago and St. Paul and Minneapolis on the different lines is so competitive that there is a constant endeavor to provide some extra comfort or pleasing features to attract first-class travel. The most recent result of this is seen on the Chicago, Burlington & Quincy, where cars have been introduced which provide for the special comfort of women passengers, having a separate reception room or parlor for their exclusive use. Two of these new parlor cars, one on the Minnesota Limited leaving Chicago at 6:30 p. m., and one on the Chicago Limited leaving St. Paul at 8:30 p. m., were put in service May 1. They are 77 ft. 6 in. long over the end sills, and have steel underframes, which are illustrated in detail. The weight of the car body is 85,600 lbs., and the two six-wheel trucks weight 40,000 lbs., making a total of 125,600 lbs.

The interior arrangement is shown on the floor plan, and not only presents the new features which are intended to contribute to the comfort of women passengers to a larger extent than first-class cars now in general use, but also provides an unusually large seating capacity in a lounging and smoking room for men. The men's lounging room is 41 ft. 5 in. long, with a seating capacity for 39 passengers. It is divided into three sections, the end one being furnished with chairs, the middle one with side seats, and the inner compartment with chairs, a sofa and table. Next to this is the buffet kitchen, and beyond is the women's reception room, which is 20 ft. long and has a seating capacity for 15.

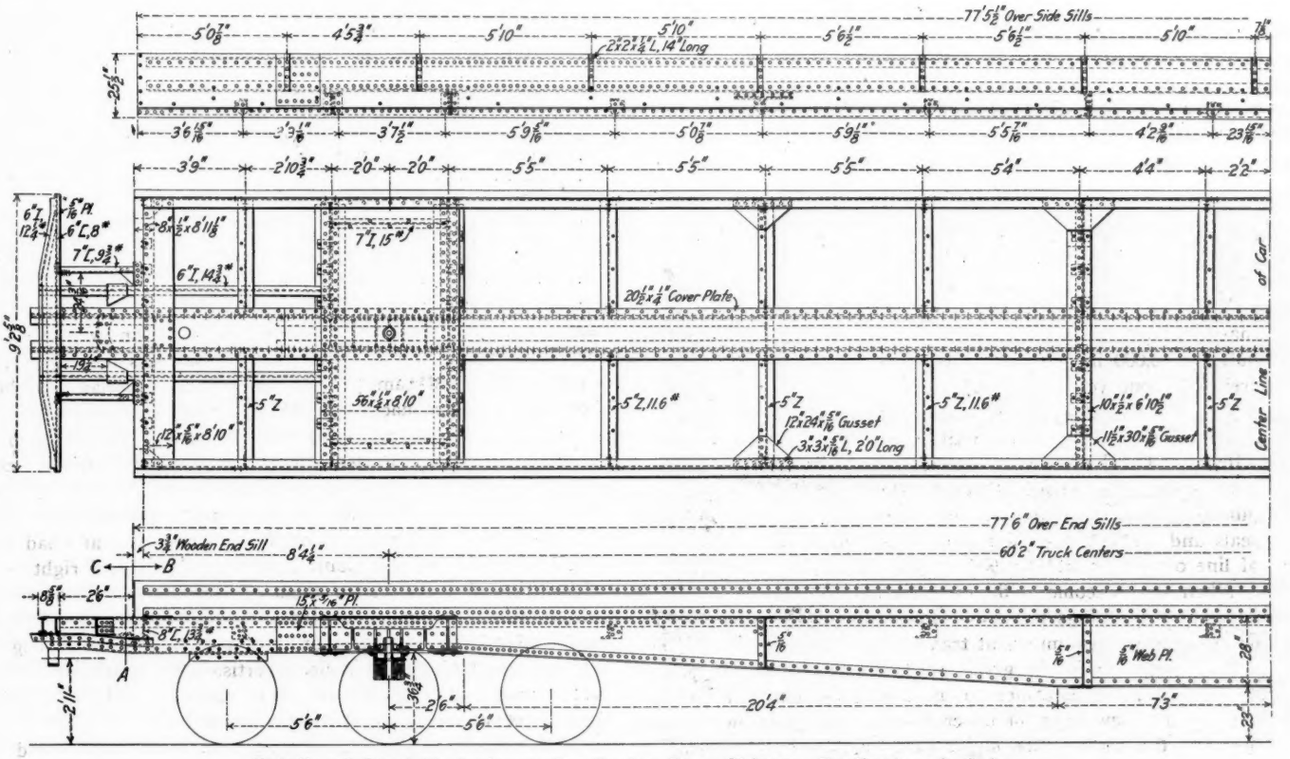
The large easy chairs and sofa are upholstered with frizette in a delicate shade of green, and there is a writing desk in a cozy corner which extends out over the platform. The interior finish and furniture is made of Cuban mahogany in the French



Parlor Car with Women's Reception Room.



Cross-Sections of Steel Underframe of Burlington Parlor Car.

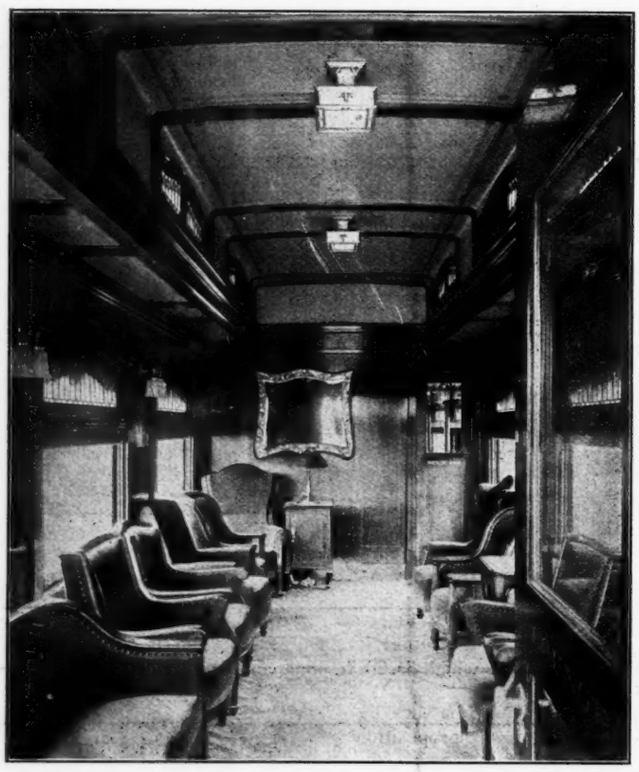


Details of Steel Underframe for Parlor Car; Chicago, Burlington & Quincy.

Men's Lounging Room.

empire style. The chairs in the men's room are upholstered in brown leather.

The construction of the steel underframe is clearly shown. The center sills are 28 in. deep at the center, and consist of a box girder with webs 5/16 in. thick, top and bottom angles 3½ in. x 3½ in., and a top cover plate ¼ in. x 20 in. These sills are continuous between the end sills and at the body bolster are riveted to a ribbed steel casting which extends between them. The body bolsters are 14¼ in. deep at the center and 10 11/16 in. at the ends, and are made of rolled plates and angles. The side sill is 24 in. deep and 5/16 in. thick, with a 4 1/16 in. Z-bar at the bottom and a 3½ in. x 3½ in. x ⅝ in. angle at the top.



Ladies' Reception Room; Burlington Parlor Car.

TRAIN ACCIDENTS IN AUGUST.[1]

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of August, 1911. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
1.	Mo. Pacific	Wagstaff, Kan.	bc.	P. & F.	..	..
7.	Seaboard A. L.	Petersburg.	xc.	P. & F.	2	0
†20.	Chi., R. I. & P.	Flagler, Col.	xc.	P. & F.	1	0
25.	Pitts. & L. E.	Pittsburgh.	xc.	P. & F.	0	25
29.	Erie	Newburgh, N. Y.	xc.	F.	0	0
31.	Ulster & D.	Halcottville.	bc.	P. & P.	1	4

Derailments.

Date.	Road.	Place.	Cause of derailm't.	Kind of Train.	Kil'd.	Inj'd.
2.	Balt. & Ohio	Salem, W. Va.	unx.	P.	2	0
2.	Southern	Watauga.	malice.	F.	1	2
†3.	Wichita Valley	Penick.	wind.	P.	1	25
4.	Southern	Salisbury.	unx.	P.	0	5
6.	Pennsylvania	Indiana Har.	....	P.	0	1
7.	Nor. Pacific	Moorhead.	....	P.	3	3
7.	C., C. & Ohio	Penland.	unx.	F.	1	1
7.	Ga., F. & Ala.	Colquitt.	acc. obst.	P.	1	2
13.	Cent. Ga.	Americus.	malice.	P.	2	1
13.	Penn.	Fort Wayne.	exc. speed	P.	4	50
14.	Balt. & Ohio	Buckhannon.	unx.	P.	1	0
†17.	Seaboard A. L.	Lumberton.	d. track.	P.	1	12
18.	Cleve., C., C. & S. L.	Columbus.	d. switch.	P.	0	50
20.	Southern	Sueville, S.C.	burn'd b'dge	P.	1	0
†25.	Lehigh Valley	Manchester.	b. rail.	P.	29	50
25.	Seaboard A. L.	Plant City.	malice.	P.	0	3
27.	Cin., H. & D.	Kirkwood.	b. rail.	P.	1	3
†27.	N. Y., N. H. & Hart.	Middletown.	....	P.	1	50
27.	Southern	McDonough.	d. switch.	P.	0	25
29.	Southern	King's Mtn.	unx.	P.	0	22
29.	St. J. & Lake C.	E. St. Johnsb'y.	sand.	P.	..	2
29.	St. L., I. M. & S.	Sterlington.	cow.	P.	2	4
30.	Hocking V.	Columbus.	d. switch.	P.	0	0

Manchester.—The passenger train derailed at Manchester, N. Y., on the 25th, was No. 4 eastbound, and is said to have been running about 25 miles an hour; the speed being limited by rule at this point, which is in or near a yard. The train consisted of two engines, two baggage cars, one parlor car, one dining car, and eight coaches. The derailment was due to a broken rail, but the engine and the first four cars passed over in safety. The next two cars ran off the track, and after running about 200 ft., came to a deck girder bridge over a stream; and both fell off at the right hand side of the bridge, one being broken in two and crushed, and the other lodging nearly in a perpendicular position, with one end resting against the side of the bridge. Nearly all of the persons fatally injured were in these two cars, and the majority in the first one, which was forced with greater momentum against the east abutment of the bridge. The stream was shallow and no persons were drowned. Twenty-seven passengers and two train men were killed, and about 50 persons were injured.

Indiana Harbor.—The derailment at Indiana Harbor, Ind., on the 6th, was of the 18-hour train from Chicago to New York.

[1] Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterick, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

The front wheels of the engine truck left the track and ran alongside of the rail for some distance. The engineman noticed the ballast flying, but thought there was something dragging. He applied the air for a service stop and then found that the wheels were off the track. The engine slid over the bank and the tender partly followed. The club car and dining car next behind the tender were derailed but remained level with the tracks. The dining car was derailed promptly and went forward with the train. The fireman jumped from the engine, or was knocked from the step by the end of a cross tie. He had two ribs broken and sprained his ankle. The engineman, train crew and passengers were all uninjured, the cars being all of steel. The train was on time, running about 50 miles an hour and on perfectly straight track in good condition. The derailment, although not entirely determined, is thought to have been caused by a nut, or some other obstruction, on the rail.

Fort Wayne.—The train derailed at Fort Wayne, Ind., on the 13th, was the 18-hour Pennsylvania Special, drawn by two engines, the derailment occurring about 6:44 p. m. The engines and first five cars of the train were derailed at a temporary No. 10 cross-over which had been installed for diverting traffic during track elevation work, speed being restricted by general order to run ten miles an hour over the cross-over, the general order having been signed by the two enginemen on the train. The time table also contains an instruction restricting speed through all turn-outs to ten miles an hour. An officer of the road says that during the trip west to meet the train (as explained below) both engine crews looked over the layout, the engines having been stopped at that point. The surviving fireman of the second engine states that he and his engineman noted the conditions particularly at this time and, on the return trip with the train, he warned his engineman of the excessive speed approaching the cross-over, and the engineman signaled to the leading engineman to slacken. This engineman is not yet in condition to give his testimony.

The engines hauling the train on that portion of the division west of Fort Wayne had failed, and the engines and crews that were to haul the train from Fort Wayne to Crestline were sent west of Fort Wayne a distance of about 38 miles to meet the train. The train was about one hour late and was running at high speed which was but slightly reduced at the point of derailment (an employee in the vicinity testified to seeing fire flying from the brake shoes of cars at rear of train) and as a result both engines and five cars of the passenger train were derailed, the engines turning over on their sides and colliding with the engine of a freight train approaching at low speed on an adjacent track, this engine also being derailed, together with seven freight cars.

All cars in the passenger train, excepting the dining car, were of steel, and withstood the shock remarkably well, the principal damage being to underframes, one side of the club car, and the platforms of the dining car.

One of the two enginemen, and one of the two firemen on the passenger train, were killed; the engineman of the freight train and the baggage master of the passenger were also killed; the other engineman was seriously hurt but will probably recover. Fifteen other employees, two mail clerks, and twenty-eight passengers were injured. This derailment was reported in the *Railway Age Gazette* August 18, page 346.

Columbus.—The train derailed at Columbus, Ohio, on the 18th, at an interlocked switch, was an eastbound express No. 46. About 40 passengers were injured, most of them only slightly. The train approached a crossing at 50 or 60 miles an hour. When a very short distance from the home signal, the signalman ran out and gave a hand signal to reduce speed. The engineman had already applied his brakes, but immediately applied them with full force, and had reduced his speed to about 25 miles an hour when it passed over the switch which caused the derailment. The engine and the first three cars passed over this switch and the fourth car and the four behind it were derailed and overturned. The signalman in lining the route up for this train was unable to clear the home signal and discovered the cause to be a bent plunger in the lock on a facing switch close to the crossing. He disconnected the lock; but for some reason which he could not explain, he disconnected the switch also. He admitted that he had spikes and a spike maul ready, and debated with himself whether to spike the switch or not; and decided not to. He set the signals clear; but when the train was near he appears to have become alarmed, and he ran out and gave a slow signal by hand. He had been in the service for a number of years, and his error is unaccountable.

Middletown; Penick; Newburgh.—The derailment at Middletown, Conn., on the 27th is attributed to malicious loosening of a rail. Four suspected persons were arrested September 11. The derailment at Penick, Tex., on the 3rd was caused by a cyclone which occurred at about 9 o'clock in the evening. Three passenger cars were blown off the track. The collision at Newburgh, N. Y., on the 30th happened while a train was being moved in or near the yard and, according to the accounts, 30 of the 65 cars in the train were wrecked.

Electric Accidents.—Of the ten accidents to electric cars reported in the newspapers as occurring in the United States in the month of August, two are reported as having been attended with fatal results; a runaway in Philadelphia and a collision at Warren, Me.

CONSTRUCTIVE AS WELL AS RESTRICTIVE REGULATION OF INDUSTRY.*

BY FRANK W. NOXON,
Secretary, Railway Business Association.

The association which I serve holds that before the national or state government adopts a new policy which is offered as a medicine for railways we should know all about how it was compounded. We want to assure ourselves that it will not kill the patient. The railways have sometimes felt that they were a sort of poison squad themselves. It is said that a Chinese official rushed into a drug store in Peking and cried out, "Who's that foreign devil running out of your place?"

The owner answered, "He asked for a permanent cure for headache."

"And what did you give him?"

"I gave him rat poison."

You see what may happen when folks get to disliking each other. The fact is that the railway men of America are not foreigners, but patriots, and their work is not devilish, but a magnificent public service performed better and cheaper than in any other country under the canopy. Just because that service is the best in the world, and because it is given on the narrowest margin in the world, we scrutinize with anxiety any proposition to change the conditions by legislation. Every manufacturer knows something about the framing of policies in his own business. You are accustomed to the exhaustive investigation of new propositions. You cause all available facts to be obtained from the most reliable sources. You secure information and advice from competent experts. You find out how the thing has worked wherever tried. You confer with men of tested and proved experience and wisdom. Then if you decide that the scheme is sound you go carefully over your situation. How much will this cost? How much machinery must be scrapped? Is the working capital adequate for the purpose? Would the innovation unduly disturb the existing organization? Is this a favorable time to try it? Have all alternative propositions been investigated? Is there any other problem which is more urgent? All these and sometimes many more precautions you take before adopting a new policy in the management of your business. That is the business method.

Now, when a new proposition is brought forward to be adopted

*Extracts from an address before the recent convention of the National Association of Box Manufacturers, Hotel Netherlands, New York City.

in the governmental regulation of railways we ask whether this accepted business method has been followed. If the advocates reply that they have done something just as good, we feel it our duty to ask for the real thing. We hold that it is of the highest importance to the business interests of the country that changes of policy affecting railways should be entered upon with the same caution that would be exercised by the private responsible manager of any enterprise equal in extent.

We have found business men ready to co-operate with us. They mean to be fair, and they realize that wisdom in the regulation of railways will pave the way for wisdom in the regulation of commercial concerns. And already the regulation of industries has begun. Prosperity for the country will be restored or postponed, it will be thoroughgoing or hesitant, according to the sagacity of political leadership. Political leadership will be conservative, according to public opinion. All those interested in any enterprise, no matter of what size, have a stake. Nobody can afford to remain indifferent or passive. The determination of policies in state and nation affecting industries and transportation is everybody's business. It is a time for clear thought and bold speech. Clear thought is not easy. Questions of prosperity are confused with questions of wrong-doing. The development of what we call big business has made it necessary to meet new conditions with new safeguards. These will be provided, and wrong-doing will be prevented or punished. New standards are rooted in the public purpose and new devices will be found to enforce those standards. Wise citizens will acquiesce, just as they accept the common ordinance for the maintenance of public order and private honesty. The first requisite for a safe way out of our present commercial stagnation and anxiety is for business and railway men to show sincere and cheerful concurrence in the general proposition that the public shall maintain control over enterprises so far as may be necessary to protect the rights of all. This will tend to give the people confidence in men of affairs.

The next step is to give men of affairs confidence in the wisdom of the law-givers. This step is for political leaders. Such leaders face the perplexing problem. Without public support they cannot lead anybody or accomplish anything. Like Solon of old, they are tempted to give the people only "the best laws they will bear." The public has for several years been undergoing a thorough education in one direction—it has been taught that wrong must be put down. This has not been accompanied by any corresponding education of the public in another direction—it has not been taught that business which is all right must be built up. The legislator who confines his activity to what seems now to be uppermost in the minds of the people will busy himself wholly with the correction of evils. What is the result? Just what it might be if the common council of a city should devote its entire attention to the police department: The city would suffer from neglect of schools, sanitation, fire protection, water service, lighting, streets, transit and finance. Political leadership must broaden its view. Statesmen must embark upon the "glorious undertaking" recommended by Montesquieu—"to render a government subservient to human happiness." Not the temporary joy of the chase in running down malefactors, but the solid comfort of steady prosperity. Let theirs be that justice whose mouth bringeth forth wisdom. Political leaders must focus their energies upon measures which will promote industrial stability.

It will not be as difficult as some of them may imagine to arouse popular interest in the dangers which are involved in neglect of that subject. A memorable instance has just occurred in Alabama. New leaders in that state went into the primaries last year on just that programme. The people jumped to the opportunity. The state convention of the dominant party boldly declared that public service corporations "are entitled to fair treatment," and that "capital invested in such enterprises should not be denied the opportunity of earning just and reasonable compensation." The new governor, Emmett O'Neal, told the legislature: "Your election, as well as mine, was a clear, positive and unambiguous mandate by the people for the restoration of that spirit of moderation and conservatism under which inspiring influence Alabama will confidently and triumphantly advance to the great future that awaits her." The legislature promptly passed an unprecedented address to the country. This proclamation frankly acknowledged that "by reason of legislation heretofore enacted in this state an impression has been created in many quarters that capital invested in Alabama may not have the conservative safeguards thrown around it that obtain in other sections of the country." It was then "hereby formally set forth and declared to be the permanent and settled policy of the state of Alabama that property rights . . . shall be rigidly and scrupulously protected, that investors of capital . . . shall have thrown around them the protection of wise and just laws, to the end that the great resources of mine, field and forest may be developed to their fullest scope and capacity."

That is the policy on which political leaders in Alabama went to the people and on which they have been entrusted with the government of the state. The reception given to that doctrine by the people of Alabama awaits the leaders in other states if they will seize their opportunity.

BRAKE SHOE FRICTION.*

The M. C. B. brake shoe testing machine has a flywheel of such dimensions and weight as to be equal in energy or stored work, to the energy of a moving loaded freight car of approximately 100,000 lbs. gross weight; it is mounted on a horizontal shaft with a car wheel. The motor or engine which drives this shaft may, when the desired speed is attained, be disconnected by means of a clutch, thus allowing the wheel to run by its inertia. A brake shoe is applied by means of weights which may be varied. It is prevented from being dragged with the wheel by a horizontal rod, corresponding somewhat to a brake hanger, which is connected to a dynamometer. This moves a pencil across a roll of paper which is driven by the machine. The height of the diagram indicates the tangential pull of the shoe at any instant, and the distance along the base line represents distance run, or car travel. The quotient of the tangential pull, recorded on the paper, divided by the shoe pressure gives the co-efficient of friction. Neglecting the actual distance from the shoe face to the hanger, the reading of the balance corresponds to the amount of friction or to the frictional force acting with a tendency to stop the rotation of the wheel. It is this frictional force which is recorded by a brake shoe machine, and a division of shoe pressure, or a change in vertical scale on the diagram, is all that is necessary to convert it into the co-efficient of friction.

In papers and remarks by others before other conventions the following facts have been brought out:

Co-efficient of friction (at least with moderate pressure) varies inversely with the speed. It changes with continued rubbing and temperature. It varies inversely with the pressure. The M. C. B. specifications for shoes recognize the effect of pressure, where, for example, on cast wheels 22 per cent. is required with pressure of 2,808 lbs., and but 16 per cent. with pressures of 8,640 lbs. It varies with tire and shoe materials. Thus, in the design of machinery bearings, similar metals are seldom run together, on account of reducing frictional resistance.

A few tests were made, covering various degrees of shoe and wheel wear, to illustrate some of the above variations. While it seldom happens that a large proportion of the shoes in a train are entirely new at the same time, the results may be of passing interest, and they will at least serve to illustrate some of the above-mentioned variations. All shoes used were of cast iron with steel backs, without inserts or chills, and were all poured

*Abstract of a paper on The Friction of New and Worn Brake Shoes on New and Worn Cast Wheels, presented before the Air Brake Association by A. S. Williamson.

from the same ladle. Shoe pressures of 2,808 lbs. were used in preference to the higher pressures of 6,840 lbs., at 70 per cent. braking power the lower figure implies freight cars of normal light weight.

The diagrams shown in Fig. 1 are almost self-explanatory. The upper one is a composite of tests of new shoes on a new wheel. The wheel was flanged and coned, was not ground, and was not cast with a straight tread especially for brake shoe machine work. The shoes fit as they happened to, as in practice, except that the adjustment of the wheel and brake head prevented the crowding of the flange or throat. In a rough shoe and rough wheel the pressure per unit of actual contact surface was of course high. In his paper, entitled What Stops a Moving Train, Mr. Dudley takes us through a range of co-efficients from 7 to 24 per cent. In the Lake Shore tests the co-officient appeared to be below 9 per cent. In tests with 18,000 lbs. at 80 m. p. h., by Mr. Sargent, it ranged around 7 to 10 per cent., and similar co-efficients have been obtained by the writer in stops from 80 m. p. h. on steel

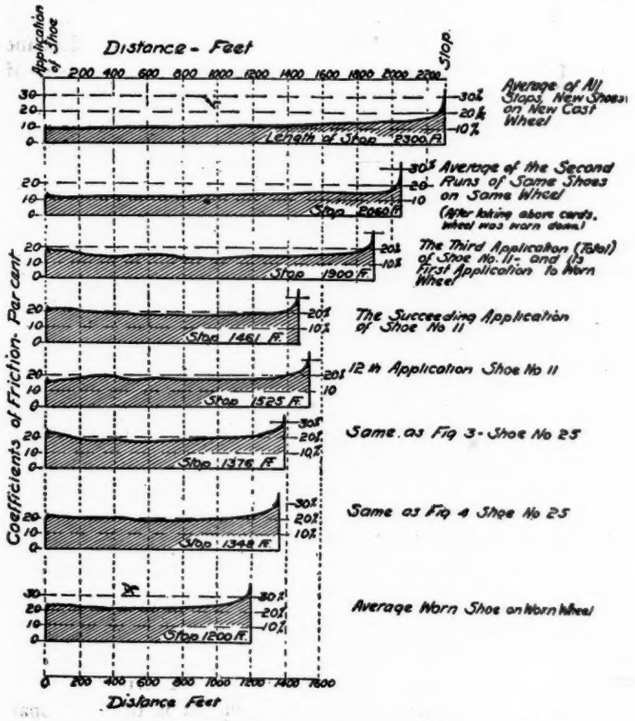


Fig. 1.—Diagram Illustrating Co-efficients of Friction in Various Stops.

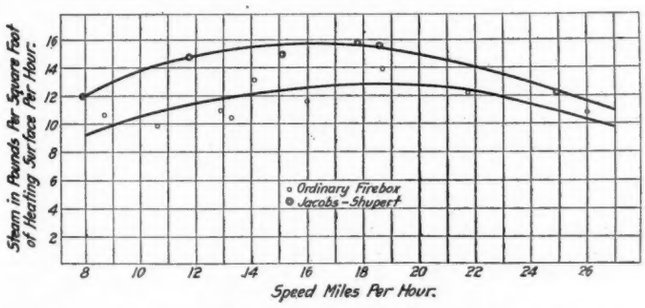
tires. The high unit pressure of imperfectly fitting shoes should lead us to anticipate similarly low co-efficients, but any such conclusion must be modified by the consideration that the speed was low. On the other hand, the materials in contact were hard. The increase in co-efficient at the stop, and especially as static friction is reached, is apparent.

The second diagram is similar to the first, the wheel and especially the shoe wear being slightly increased. The wheel was then run several hundred miles with as frequent applications of an emery shoe as could be made without danger of brake burns, followed by repeated applications of other shoes to make the tread as nearly normal as possible. The lower diagram is a composite of various applications of worn shoes on the worn wheel. The co-efficient of friction is normal and fulfills the M. C. B. requirements. The intermediate diagrams are miscellaneous representative tests of nearly new shoes on a worn wheel. The variations are none too regular, as is to be expected of new shoes, and they are introduced to show the variations which result from slight changes in actual contact surface, even during one stop. The diagrams are possibly of incidental interest as indicating that a new imperfectly fitting shoe on a new wheel has half the stopping effect of an old shoe on an old wheel, but they are presented primarily as illustrations of the combined effects of several of the variables which we have mentioned. The intention has been to illustrate briefly the present methods of finding the friction qualities of any particular shoe, to show the combined effects of several of the factors mentioned, and to furnish a basis for discussion. I have made many tests under various conditions of speed pressure and heat, with weights and with air applications, including tests at 80 m. p. h. and 18,000 and 20,000 lbs. pressures.

WATER CIRCULATION IN LOCOMOTIVE FIREBOXES.

BY H. B. MACFARLAND, M.M.E.

The design and development of the Jacobs-Shupert firebox has caused considerable discussion of the relative value of this new type of sectional construction in comparison with the ordinary firebox, with its flat sheets and numerous staybolts. Water circulation was the main question considered in the discussion of this firebox at the recent Master Boiler Makers' convention at Omaha, Nebraska, the discussion being reported in the *Railway Age Gazette* of June 2, 1911, page 1263. The circulation in a locomotive boiler results from the motion of the locomotive itself, from the velocity of the entering water, from temperature changes in the body of the water itself, and from the drawing off of steam from the boiler. The circulation at any instant is variable depend-



Evaporation Curves for the Ordinary Firebox and for the Jacobs-Shupert Firebox.

ing on these conditions. Of the forces causing circulation, the most active is due to the inertia of the water itself. Water circulation produced by heat conductivity is the least efficient in establishing uniformity of temperature throughout the boiler. While temperature measurements made at different points of the firebox are indicative of circulation to a certain extent, they are not a positive measure. This is especially true for relatively low velocities, such as must occur in a firebox with large water legs.

A special study and investigation of the circulation of water, and the location of solids and suspended matter in the water spaces around the firebox of a locomotive when in operation, was made on the Atchison, Topeka & Santa Fe, while road tests were being conducted on locomotives of the ordinary type firebox and with the Jacobs-Shupert type. The results obtained were of value in establishing a satisfactory theory of water circulation in the firebox and in determining the principal location of solids and suspended matter at times when the engine is working hard and is liable to foam on account of bad water. Samples of water were taken for analysis at various times during each run from the same relative position around the firebox of both engines. Four sampling tubes were arranged in a vertical row on the left side of the firebox about mid-way from front to back, as shown in the accompanying illustration. Tube No. 1 was placed at the mud ring; No. 2 was at the top of the brick arch, or about 8 in. above the mud ring; No. 3 was half way up the side of the firebox, about 42 in. above the mud ring; and No. 4 was near the water line of the boiler.

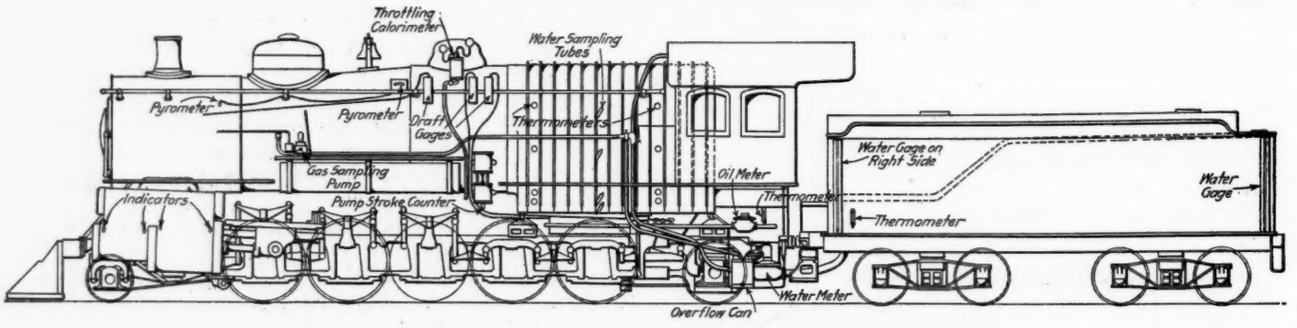
The sampling tubes consisted of cylinders 2 in. in diameter

and 8 in. long. One end of each cylinder was connected to the firebox by means of a short piece of 1½-in. pipe fitted with a globe valve. A pet cock was attached to the bottom of the cylinder. In taking the sample of water the pet cock was first opened, and then the globe valve. The water blown from the boiler forced the air out of the cylinder and also washed out any sediment that might have been deposited in the piece of pipe. After the cylinder was thoroughly cleaned out the pet cock was closed and, a few minutes later, the globe valve was closed. In this way about a pint of water, representative of conditions at this point of the firebox, was obtained. The water was allowed to stand in the cylinder until it had cooled sufficiently so that when drawn from the cylinders into a sampling tube it did not flash into steam.

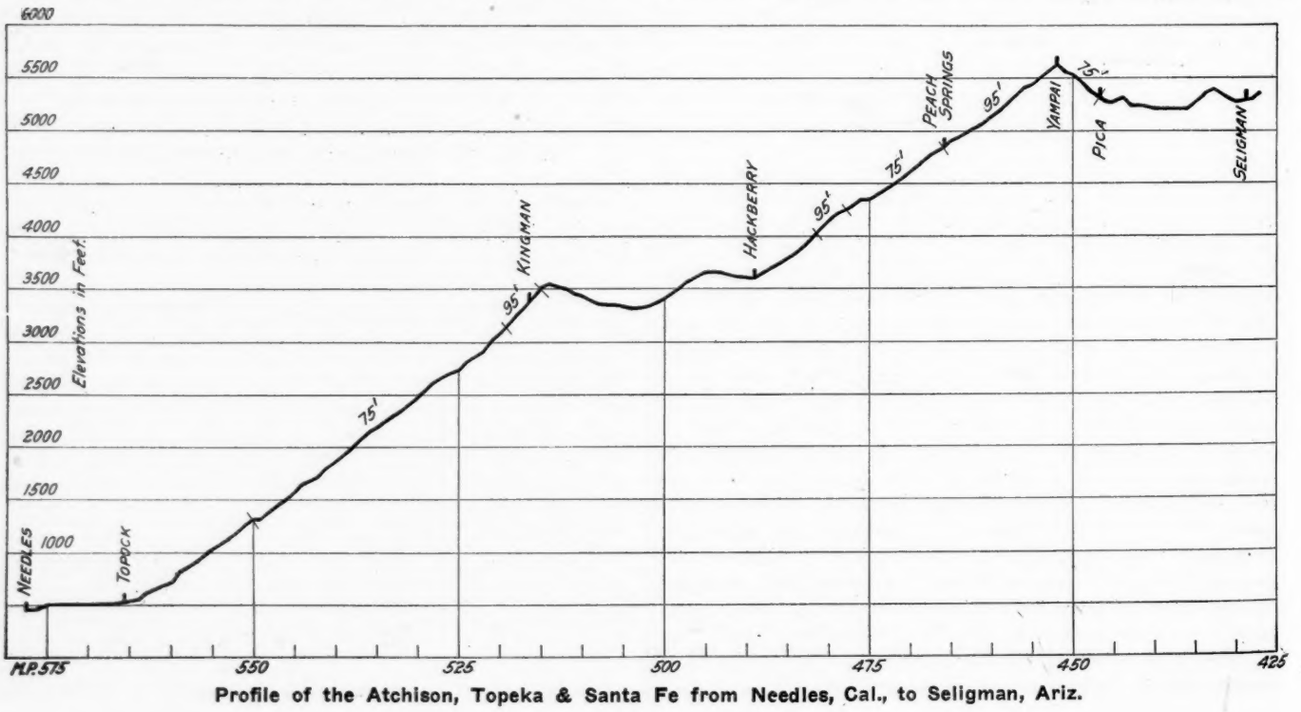
Since all particles of undissolved matter in the water would be carried along in the boiler and in the water leg, due to the velocity of the current of water, a study of the location of suspended matter at different times and for different positions will give some idea of the direction and force of these currents. Therefore, the suspended matter, and also the total solids, as determined from the water analysis, may be used to indicate the nature of the boiler circulation. The samples of water secured for analysis from the various points in the boiler must be taken at the same time, before conditions of circulation change, in order to obtain consistent results. There was, however, some irregularity in these analyses due to the fact that during the tests the samples of water could not be taken at exactly the same time.

The data showing analyses of waters secured from the two different engines, is presented in the accompanying table. In analyzing the conditions as obtained from the composition of the water samples taken from the engine with the Jacobs-Shupert firebox, definite conclusions can be drawn as to the circulation of the water in the boiler. As long as the suspended matter is nearly constant at the various points, there is assumed to be a positive circulation around the firebox. For example, a study of the samples taken during run No. 12, going into Yampai, shows a great uniformity and reveals the fact that there is a regular increase in the suspended matter, as well as in the total solids from bottom to top, showing the force of circulation toward the top of the boiler. These samples were taken after pulling up a 75-ft. grade from Pica, a distance of 5 miles, with the locomotive working at its full capacity. A consistent uniformity of conditions is also found in the samples taken upon arrival at Needles at the end of the trip.

During run No. 11, there is a uniformity of conditions with the same general increase in suspended matter and total solids from bottom to top, indicating an upward circulation. On this trip, the samples taken while going up Kingman Canyon, show a regularity in the total solids but an irregularity in the suspended matter, which may be accounted for by the fact that the injectors were on at the time the samples were taken. In noting the analyses of samples 5 to 8, inclusive, taken at Kingman on the same run, it will be seen that there is a decrease in the amount of suspended matter in each of the samples, showing



Locomotive Arranged for Road Tests; Atchison, Topeka & Santa Fe.



Profile of the Atchison, Topeka & Santa Fe from Needles, Cal., to Seligman, Ariz.

how effectively the suspended matter has been thrown down after the engine had stood for some length of time.

It is to be noted for the round trip runs, 11 and 12, that there is a continual increase in the total solid matter in the samples from any given tube. This is explained by the fact that during a complete round trip more and more water is taken into the boiler and evaporated; consequently the total solids remaining must increase gradually, although blowing off has the effect of a temporary decrease. There is a greater decrease in the total solids for trips Nos. 13 and 14 than for trips 11 and 12, because the boiler was washed more thoroughly after trip 12 than after trip 10.

Samples 42 to 45, inclusive, from trip 16, were taken while going into Hackberry. They show the same general relation of the total solids, indicating currents towards the top, and also that there was no undue amount of solids at the bottom of the water leg near the mud ring. These figures confirm all predictions regarding positive circulation claimed for the Jacobs-Shupert firebox and denotes clearly that there is a very complete circulation around this firebox.

A careful study of the analyses of water samples from the engine equipped with a firebox of ordinary construction in comparison with those from the engine equipped with the Jacobs-Shupert firebox, reveals a difference in the water circulation in the two fireboxes. In most cases the total solids and the suspended matter for the engine with the ordinary firebox show an inclination to increase towards the bottom, indicating a very much decreased force of upward currents, or possibly the presence of currents in another direction. There is no regular increase in the total solids and the suspended matter from the bottom to the top of the boiler as is the case of engine with the Jacobs-Shupert firebox. On run 25, samples of water were taken from the four tubes after the engine had been standing for 30 minutes with the injector off. Blow-off cocks were then opened after which further samples were secured. A comparison of the analyses of samples secured before and after blowing off, shows an increase in the amount of the total solids as well as the suspended matter at the points where the samples were taken. Such results apparently indicate that the object of blowing off, which is to reduce the suspended matter and solids, had not been accomplished. Such a conclusion, however, would not be correct. The apparent paradox is explained as follows: The water in the back head of the firebox, due to cooler temperatures and less circulation, undoubtedly contains a great many more grains of solids and suspended matter per gallon than that in the front portion around the firebox. The blow-off cocks being located in the front portion of the firebox, will, when open, draw the water from the back to the front. This movement causes an increase in suspended matter and solids at the middle sections where the sampling tubes were located, during and just after the period of blow-off.

This fact shows that a complete substantiation of the theory of boiler circulation cannot be effected, nor the location of solids and suspended matter around a firebox be fully determined by taking water samples from only one vertical section of the firebox. However, the results in this direction show that the circulation in a Jacobs-Shupert firebox is very positive and much better than in an ordinary firebox. Rapid and positive circulation in a boiler, especially around the firebox, results in a higher rate of heat transmission through a unit of heating surface and, hence, a better steaming engine.

This data on the analyses of the waters, was obtained during comparative tests of the same class of power handling practically the same tonnage over the same district. The evaporative performances of the two engines were practically the same, although the evaporation per square foot of heating surface per hour, was somewhat greater on the engine with the Jacobs-Shupert firebox than on the engine with the ordinary type of firebox, the actual increase being about 20 per cent. Further road tests on an engine with the Jacobs-Shupert firebox and an engine with the ordinary firebox, shows an increase in evaporative efficiency per square foot of heating surface per hour of 35 per cent. Comparative tests of two engines over the same territory, one with the Jacobs-Shupert firebox and the other with the ordinary type of firebox, shows an average evaporation per square foot of heating surface per hour to be 29 per cent. greater for engine with the Jacobs-Shupert firebox than for the engine with the ordinary firebox, at speeds ranging from 8 to 16 m. p. h., as shown in the accompanying chart.

ANALYSES OF WATERS FROM JACOBS-SHUPERT FIREBOX.

Sample number.	Tube number.	Grains per U. S. Gallon. Total solids.	Suspended matter.	
		Run 11.		
1	1	122.4	17.5	
2	2	163.8	37.9	
3	3	192.4	19.8	Going up Kingman Canyon.
4	4	188.9	20.4	
5	1	138.7	25.9	
6	2	158.0	13.4	
7	3	177.8	11.1	After standing 30 minutes at Kingman.
8	4	220.4	17.5	
9	1	208.7	30.7	
10	2	213.4	30.3	
11	3	223.3	33.2	Going into Peach Springs.
12	4	241.9	36.1	
13	1	184.8	29.7	Pica, before blowing out.
14	1	181.3	50.7	Pica, after blowing out.
		Run 12.		
21	1	219.2	36.1	
22	2	211.1	36.1	
23	3	246.0	39.0	Going into Yampai.
24	4	245.4	40.8	
25	1	202.9	32.6	
26	2	200.5	27.0	
27	3	222.1	39.1	Upon arrival Needles.
28	4	227.9	40.2	
		Run 13.		
29	1	60.6	2.3	Leaving Needles.
30	1	174.9	13.4	
31	2	167.9	14.6	
32	3	199.4	19.3	Going into Hackberry.
33	4	192.4	22.1	
		Run 14.		
34	1	180.7	40.2	
35	2	181.3	39.1	
36	3	190.6	39.6	Going into Hackberry.
37	4	199.4	42.0	
		Run 16.		
42	1	155.1	36.6	
43	2	159.2	36.7	
44	3	176.6	33.2	Going into Hackberry.
45	4	166.7	36.7	
46	1	176.6	28.6	
47	2	176.6	31.5	Taken at Kingman after standing 30 minutes with injectors off.
48	3	195.3	35.0	
49	4	200.0	29.1	

ANALYSES OF WATERS FROM ORDINARY FIREBOX.

Sample number.	Tube number.	Grains per U. S. Gallon. Total solids.	Suspended matter.	
		Run 23.		
1	1	174.3	21.6	
2	2	180.7	17.5	Going up Kingman Canyon.
3	3	174.3	15.2	Throttle open. Injector on.
4	4	185.5	16.9	
5	1	148.1	32.9	
6	2	172.6	25.6	After standing 30 minutes at
7	3	166.7	20.4	Kingman. Injector not
8	4	172.6	19.2	working.
10	1	159.1	16.3	Same as Sample 5. Taken after blowing off.
		Run 25.		
11	1	46.6	8.2	Leaving Needles.
12	1	139.9	16.3	
13	2	135.8	18.6	Going up Kingman Canyon.
14	3	151.6	14.6	Throttle open. Injector on.
15	4	146.9	15.7	
16	1	153.9	17.5	
17	2	153.9	18.1	After standing 30 minutes at
18	3	152.2	16.3	Kingman. Injector not
19	4	148.7	16.3	working.
20	1	151.6	22.7	
21	2	158.6	21.0	Same as Samples 16, 17, 18
22	3	155.7	21.0	and 19, after blowing off.
23	4	155.1	16.9	

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XVI.

Salt Lake City, Utah, July 22, 1911.

My Dear Boy:—Supplies and purchases are a feature of railway operation illustrating the tendency to overcentralization through overspecialization. Please notice that I say supplies and purchases; not as some roads do, purchases and supplies. Is not "supply" the broader term, including "purchase" as a very important component? If we happen to make some of our supplies from our own scrap, a question of supply and accounts is involved, but not necessarily one of purchase. The volume of work involved in purchasing for a large railway may be so great as to warrant the segregation of the purchasing function.

Among the best purchasing bureaus in the United States are those of the Harriman Lines. As I understand it, their able director of purchases does not, as many people suppose, scrutinize all requisitions. Each of the eight vice-presidents and general managers has his own purchasing agent who, under the broad policy of local autonomy, buys many articles as best he can. Those large items which experience proves can best be bought for all by the director of purchases, are so purchased under blanket contracts. For those items the local purchasing agent becomes an ordering agent. The point of it all is that no iron clad rule is laid down. Because some items can best be purchased in bulk, it does not follow that local administration should be hampered by requiring all items to be so procured. Instead of a narrow, rigid rule, there is a broad policy enunciated which permits the discriminating judgment of experience to decide questions on their individual merits under the ever-changing conditions of service.

When railways are older similar broad treatment will be accorded other features of operation as well as supplies and purchases. Broad policies and individual judgment will gradually supplant attempts to decide questions in advance in accordance with preconceived notions of probable conditions.

The evolution of the so-called store department on most railways has been a striking instance of one sided development. A railway exists to manufacture and sell an intangible commodity, transportation, not necessarily to carry either a large or small stock of material and supplies. The purchasing agent tells us in good faith how much money he has saved the company by time spent in driving good bargains. He is not in a position to know how many men have been worked to poor advantage, or have been idle, while waiting for proper tools, materials and supplies. Such features of economic waste are not always the fault of the purchasing agent. The general storekeeper and the local storekeeper, ambitious for low stock records, may hold down their requisitions. It is so easy to say that a telegram will bring a cylinder head or other spare part to the desired point. If meantime a big locomotive has been out of commission in a distant roundhouse for two or three days and a light engine has been sent to protect the run, there is nothing in the store accounts to reflect this needless expense. The individual batting averages are high, but some way the team is not winning games.

One of the fallacies introduced by the store people is that the user of material can not be trusted with its custody, because he will carry too much stock, due to an exaggerated view of future necessities. This mistaken theory is carried to the extent of denying to the division superintendent the custody of fifty shovels to be used by the emergency gang of fifty men which it is entirely within his province to order out to clear the road. The men he can command. The shovels, without which the men are useless, he must beseech from a storekeeper receiving, perhaps, one-third as much salary as himself. Of course, in an emergency, the superintendent takes the shovels, anyway. As I said before, it is a pretty poor system that breaks down in an emergency. The test of a system is an emergency. I confess my inability to see that being a user of material necessarily makes a man more indifferent to the company's interests. Perhaps it is the same habit of mind that causes me to deny greater rectitude to the man in the accounting department.

The user of material has undoubtedly been careless in many cases. Will he not become more careless if relieved of responsibility and informed that he can not be trusted? When children err, the wise parent does not disown them. From his fund of riper experience, he helps them by impressive teaching to gain a proper viewpoint. Similarly, the general storekeeper should control the superintendent and teach the latter the most economical handling and use of material and supplies. Control is comparatively valueless without authority. This authority can be most effectively conveyed by rank. The general storekeeper should not be a keeper of a general store. He should be a general officer, under the general manager, superior in rank and pay to the division superintendent. Instead of the superintendent being relieved from responsibility, he should be held to a greater accountability. The reformed and reconstructed bandit often makes a relentless police chief. The despised user of material under proper organization becomes the zealous conserver and protector.

The general storekeeper, like the chief mechanical officer, should be located in the same building with the general manager. There is no more reason for locating either one at a store or at a shop than there is for locating a general superintendent in a switch shanty near a yard. General officers must see the whole property and maintain a balance among its component units, which are normally operating divisions. If I were you, as between your purchasing agent and your general storekeeper, I would appoint the most experienced an assistant general manager, so that his office file can be logically and consistently consolidated with your own. The other of these two men, I would make purchasing agent with a distinct title and a separate office file, because of his large volume of business with outside persons. Such assistant general manager would be in effect manager of supplies and purchases, the trained expert seeing the whole problem of operation and deciding normally what material and supplies the company needs. Under such assistant general manager, would be the purchasing agent, a staff officer, specializing on the technique and psychology of bargaining. Such assistant general manager as a line officer would be his own general storekeeper and would hold division superintendents responsible for the stores on their respective divisions. His work would be coordinated with that of the other assistant general managers by the chief of staff, the senior assistant general manager.

The organization thus outlined would preclude the necessity for the usual perfunctory approval of requisitions by the general manager. The assistant general manager for supplies would normally put the final approval on requisitions. Large or exceptional items the general manager would approve. When differences of opinion developed among the interested assistant general managers as to the relative ultimate economy of different mechanical or structural devices, the general manager would be invoked to give a decision that is really worth something, because made after considering different view points. Under the old order of things, the superintendent of motive power or the chief engineer is tempted to seek the ear of the general manager on the latter's best natured day to put over a requisition for some pet device. So sporadic is the comprehensive consideration of requisitions, so perfunctory is the usual approval, that the general manager frequently tells his purchasing agent not to take the former's approval too seriously, and to hold up approved requisitions about which the latter is doubtful. This is another species of unconscious administrative cowardice which attempts to put on the subordinate the burden of responsibility for a departure from the normal. True organization and administration demand normal

procedure by subordinates. At normal speed, the administrative machine should run well balanced. When the speed becomes great enough, higher authority should be a governor brought into action more or less automoatically. Telling a subordinate habitually to question the acts of his superior has the same cheapening effect as unchecked disregard of block signals. It puts higher authority in the undesirable attitude of exploiting a fad, or an over-worked system, rather than of demanding reasonable compliance with proper and logical requirements.

Have we not overdone the matter of low working stocks? Is it not more expensive for a railway to carry too small a working stock of material and supplies than one too large? Is not the problem too extensive to warrant very rigid comparisons as between different roads? Like the average miles per car per day, does not the equation contain too many variables to admit of a very exact solution? Can we compare effectively the dissimilar conditions involved in climate, distances from producing and distributing centers, character of predominating traffic, etc.? Are not some records for seemingly low economical stocks based upon the fallacy that it costs the company nothing to ship and reship its own material? Where would these records land if company material carried a freight charge of, say, 5 mills per ton per mile? Is it not more economical to handle numerous items of supply in carload lots regardless of average monthly consumption? Have we given due weight to the concealed items of expense in arriving at conclusions as to the cost of handling company material and supplies?

Two of the best managed roads in the country, the Pennsylvania and the Big Four, had no stores department the last time I inquired. At the other extreme, we find the Santa Fe and the Lake Shore carrying their departmental system to their stores in an intensified form. In between—that happy medium which I mentioned to you—stand the Harriman Lines with division stores under the division superintendent, who in turn as to supply matters is under the general storekeeper or other chief supply official, the latter already having in some cases the title and status of an assistant general manager. The man in direct charge of the one general store which is allowed each general jurisdiction is called a storekeeper. The underlying conception is that railway stores are maintained to help make the wheels go around, that all supply activities should be concentrated upon the most economical manufacture and sale of transportation.

This brings us to another phase of the problem. Frequently a railway as a plant is adequate to manufacture more transportation than it can sell. The other fellow is getting too much of the competitive business. Investigation often shows that railway solicitors can sell a shipper no freight or passenger transportation, because his salesman receives no orders from the railway's purchasing agent. The industrial bureau of a traffic department works to create new business which is fostered by discriminating freight rates. Yes, I stand up and use the word "discriminating," because, when properly understood, it implies intelligence and science, and is therefore one of the finest words in the language. This good work of the traffic department in creating wealth and developing industrial communities in territory local to a particular road may be largely lost to that road because its purchasing agent, consciously or unconsciously, fails to exercise proper and legitimate discrimination in the performance of his important function.

At first blush, in these days of doubting insinuation and hysterical aspersion, when a railway official is often denied the presumption of possessing common honesty, when the burden of proof is to show him as having average rectitude, such a statement may be construed by distorted minds as a plea for subtle forms of rebating. Tenuous as may seem the line here between right and wrong, it can in a given case be readily determined. Too often apparent complexities are only the result of an abstruse contemplation of abstract possibilities. Give honest, fearless, practical treatment to each concrete case as it arises, indulge more in inductive reasoning which predicates laws upon facts, not facts upon laws, and complexity gives way to common sense. Transportation is the most exacting, the most diverisfied, the most far-reaching of commercial and industrial activities. It follows, then, under the law of the survival of the fittest, that those who can survive in the art and science of transportation, must be the fittest of the fit. In their hands can safely be left the solution of these difficult problems.

After three years of satisfactory experience with division accounting bureaus, the Harriman Lines have extended such activities to include the division stores. This is done by moving the division storekeeper, his accounting and correspondence clerks to the division superintendent's office in order that division records may be consolidated in one file and division accounts in one bureau. A division material-on-hand account is included. The necessary issue clerks, foremen, etc., are left at the storehouse, which is often a mile or two from the superintendent's office. Another avowed object is to get the division supply people closer to the train sheet, to give propinquity a chance to develop love, and to counteract that we-are-so-different feeling which comes on many railways, not only in the spring, but under all signs of the zodiac. The logical development on divisions of considerable volume of supply business will be to make the division storekeeper an assistant superintendent. This method of store accounting is relatively closer to real transactions, especially where the division supply train is used, than might be supposed. On the Hill lines, the store accounting is done in the general auditor's office, perhaps one or two thousand miles from the store itself, a decidedly long range proposition. Which policy is better, is of course a question of opinion. A man's views on organization and methods are largely a matter of temperament and association, just as his polictics and religion depend usually upon heredity and environment.

Affectionately, your own, D. A. D.

SOME BITS OF RAILWAY HISTORY.

The New England Association of Railway Superintendents, which was organized in Boston April 5, 1848, and which lived nine years and six months, has been brought to the attention of the present generation by the publication, through the instrumentality of the Eastern Railroad Association, of the minutes of its meetings, and to some of our older readers many of the names in the book will be familiar. Mr. Harrower, secretary of the Eastern Railroad Association, says that the book containing these minutes has been in his possession since 1875, when he obtained it directly from the widow of the secretary who kept the records.

One of the prominent members of the association for a short time was Charles Minot, who was superintendent of the Boston & Maine, though he soon resigned and went to the Erie. Mr. Minot was the man who is distinguished as the sender of the first telegraphic train order (from Turner, N. Y.), while he was superintendent of the Erie. Another prominent figure was Samuel M. Felton, superintendent of the Fitchburg road, afterwards president of the Philadelphia, Wilmington & Baltimore and father of the present president of the Chicago Great Western. From many interesting paragraphs in these minutes, which make up a pamphlet of 100 pages, we notice a few which will serve to remind some of the younger generation of railway officers that the troubles which now beset the profession are in some respects not very different from those experienced by their fathers and grandfathers.

The men who issued the call for the meeting which organized the association (April 5, 1848), and the roads of which they were superintendents, were as follows:

William Parker, Boston & Worcester.
Wm. Raymond Lee, Boston & Providence.
Waldo Higginson (Agent), Boston & Lowell.
James Barnes, Western.
Charles Minot, Boston & Maine.
S. M. Felton, Fitchburg.

One paragraph in the call was to the effect that "refreshments

(upon temperance principles) will be provided." The charter members, in addition to the foregoing, were: Joseph H. Moore; N. G. Upham; Chas. F. Gove; Onslow Stearns; John Russell, Jr.; Isaac Hinkley; S. H. P. Lee; Wm. A. Crocker; George Haven; Luther Haven; Lucian Tilton; Josiah Hunt; E. H. Brodhead. After the third meeting the minutes were uniformly signed "Wm. P. Parrott, Secretary."

One of the first matters of business was a resolution looking to "joint resistance to the application of Ross Winans for a modified renewal of patent"; and questions concerning patents, license fees, etc., and questions relating to contesting patent claims constituted the main subject at many meetings. For a long time a committee was at work on a proposition that the association should have a "rail road gazette," which seems finally to have resulted in what would now be called a railway guide. September 6, 1848, Messrs. Felton and Minot were appointed a committee to take under consideration the matter of persons riding upon the engines and to report regulations. About that same time a committee was appointed to formulate rules to regulate the matter of employing men who have been discharged from other roads. In October, 1848, James Barnes resigned his place as superintendent of the Western Railroad, and was made an associate member. In February, 1849, William Parker left the Boston & Worcester to take charge of the Baltimore & Ohio, and a committee was appointed to prepare a testimonial. In March, 1849, Charles F. Pond, of the Springfield & New Haven, was elected a member. At that meeting there was discussion of a code of regulations for passengers, for baggage and for the receipt, transportation and delivery of freight. The whole of the proposed code of rules filled only about two small pages. In July, 1849, a committee was appointed to attend the funeral of Col. George W. Whistler, who had died in Europe. At one of the meetings there was a discussion concerning sprinklers, and the fee that would have to be paid for the use of the "machines"; but what they sprinkled is not stated. In August a committee on car and wheel springs reported having found in use on the Baltimore & Ohio a car spring which consisted of "simply an oak plank placed across the car near the middle and connected with the draw links by an iron rod passing the whole length of the cars." The committee on standard time made a report recommending the time of a meridian two minutes later than the meridian of Boston, and this was recommended to all the railways of New England; but concerning the extent to which this recommendation was followed nothing appears. In December, 1849, Mr. Ashcroft laid before the superintendents a proposed new arrangement of safety plugs, and a committee was appointed to learn on what terms it could be used. The committee on patents was instructed to investigate Tyler's patent switch, for which he asked a royalty of $10 per mile of road, and to compare it with "the safety switch commonly used in England."

It seems quite evident that inventions possessing merit were not the only kind offered to the association, for in February, 1850, it was voted "that hereafter models shall be presented to the association only by a member and shall not be accompanied by any person in charge of the same except by a special vote of the association, unless such person be an invited guest for the evening." At that meeting a vote was passed requesting each member to make a monthly report of wheels taken from under engines, passenger or freight cars, on account of cracks, breakage or from being worn by sliding on the rails. Another report which was called for, but which apparently was not furnished with much regularity, was one showing all pieces of unclaimed baggage on hand at the first of each month.

In April, 1850, it was voted that as a great deal of the secretary's time was taken up by committee meetings to examine inventions, it would be proper for him to make a suitable professional charge to the patentee for his time occupied, whenever he should see fit to do so.

In July, 1850, Henry Gray, superintendent of the Western Railroad (Boston & Albany), was proposed for membership. Mr. Gray remained superintendent of the Western Railroad until about 1866.

It was resolved that each superintendent in New England be requested on the first of every month to record the numbers of all foreign merchandise cars on his road and send a report to the superintendent of the road to which the cars belonged. At this meeting we find the first mention of Mr. Tanner and his brake patent, a subject which developed controversies that long outlived this association. In November, 1850, it was voted that the next annual meeting be held at Springfield and that the superintendents of railroads in New York be invited; but we find no information as to whether they came. In February, 1851, William L. Dearborn presented to the association a box of danger signals imported by him from England, his idea being to have the superintendents experiment with them. What these were we can only guess. Mr. Kimball's patent was briefly discussed, but as to what this patent refers to the reader is left wholly in the dark. The secretary was authorized to subscribe for the *Mechanics' Magazine*, published by Appleton, New York, and for *Herapath's Railway Journal* and the *Railway Times*, published in London. At the meeting in April, 1851, Henry Gray, superintendent of the Western Railroad, was elected a member. Why he was kept waiting nearly a year is not explained. The meeting examined a chair designed by S. Ashburner, a civil engineer of Boston; also a coupling for a bell rope. A committee was appointed to investigate the claim of Septimus Norris for a patent on the use of four eccentrics on locomotive engines. Mr. Williams presented a model for a new arrangement of spiral springs for cars. A proposition was offered that express men should be required to give bonds to save railway companies from loss through their default.

In September, 1851, the secretary was authorized to spend $500 in preparation for the trial of locomotives on the Boston & Lowell; but for any further record of that famous trial we look in vain. At the meeting in May, 1852, there was exhibited a fine model for a brake for cars used on the Reading Railroad, but the members thought it was "too complicated for common use."

In January, 1854, George W. Bentley, of the Worcester & Nashua was elected a member. Mr. Bentley continued in the railway field until 1888, his last official position being that of general manager of the Jacksonville, Tampa & Key West. In January, 1855, the members inspected a cast iron joint chair fitted with rubber, which was shown to them by D. L. Davis, roadmaster of the Providence road. The chair had been in use for a year. In July, 1855, E. M. Reed, of the Hartford & Springfield road, was taken in. Mr. Reed was vice-president of the New York, New Haven & Hartford up to 1892.

At the annual meeting in January, 1857, at which nine members were present, it was voted unanimously, after an address by the president, that it was expedient and necessary that the association be preserved and continued; and there were two or three more meetings at which the subject of patents was discussed, usually with reference to some particular patent or patent claim; but at a final meeting, in July of the same year, it was voted that the association be dissolved on the first of October following, and apparently this vote was carried out.

The Russian ministry of ways of communication is working out a scheme for the electrification of the St. Petersburg railway system. It is proposed to develop the electricity from power obtained at the Volchoff weir, where an electric generating plant will be built which should yield 50,000 h. p., that is 27,000 to 28,000 kw. Of this power about 22,000 kw. will be used for electrifying the railway system and 2,000 to 2,500 kw. will be used for traction on the Lake Ladozh canal. The balance of electrical energy will then be available for sale. It is estimated that the cost of this plant will be between $7,200,000 and $8,400,000, and that the net profit will be from 15 to 20 per cent.

Maintenance of Way Section.

THIRTEEN contributions were submitted in the contest on "Drainage" which closed September 1. The first prize has been awarded to J. F. McNally, assistant superintendent, Atchison, Topeka & Santa Fe, Chanute, Kan., and the second prize to S. B. Peter, roadmaster, St. Louis & San Francisco, Pittsburg, Kan. The judges making this award were: L. C. Fritch, chief engineer, Chicago Great Western, and L. W. Baldwin, engineer maintenance of way, Illinois Central. The two prize-winning papers are published in this issue, together with the papers submitted by the following men which have been accepted: G. Le Boutillier, division engineer, Pennsylvania Lines West, Cincinnati, Ohio; J. C. Bach, roadmaster, El Paso & Southwestern, Douglas, Ariz.; A. E. Preble, supervisor, Cumberland Valley, Chambersburg, Pa.; W. T. Main, division engineer, Chicago & North Western, Chicago; P. H. Hamilton, St. Louis & San Francisco, Pittsburg, Kan.; Claude L. Van Auken, 5930 Erie street, Austin Station, Chicago; Robt. H. Orwig, supervisor, Cumberland Valley, Chambersburg, Pa. While it may appear that the same features of drainage are covered in several of the papers printed, it will be found that each brings out a very important fact and the repetition is only such as is necessary to emphasize the most essential requisites for proper drainage of roadbed. The fact that drainage can usually be secured by the adoption of a few well-established principles is evidenced by the fact that in addition to the papers published a number of well written, comprehensive articles on the subject were received in this competition, each of which covered, in the main, the points which had been found necessary in draining roadbed by men who had had long experience in maintenance of way work.

ONE of the most important duties of a track foreman is to protect, by flagmen and slow orders, any section of track he may have occasion to disturb, as to render it unsafe for traffic at the usual speeds. All rule books define the proper methods to be followed and the distance the flagman should go out. But many roadmasters simply provide new foremen with the rule books without making sure that they know and understand these rules. Examinations and surprise tests are conducted to ascertain whether trainmen know and obey the rules applying to their duties. Similar precaution should be taken to insure proper knowledge and action by the track foremen. It is much to their credit as a class that the number of accidents resulting from lack of, or improper, flagging is as small as it is. At the same time, an accident such as that which happened recently at Martin's Creek, N. J., should not be possible. Although a curve had been thrown in from 2 to 9 in. that morning and the gang had but partially done the surfacing, the flagmen were recalled an hour before the wreck occurred. No other notification of slow track, either in the form of a train order or "slow board," was out. In a case which happened near Chicago recently a flagman's failure to go out a sufficient distance while protecting a rail relaying gang resulted in the engine and two cars of a freight plunging off an embankment. The increasing number of foreigners in track gangs makes proper flagging work more difficult; but for this very reason the foreman must take more precautions to insure that the track is fully protected at all times. If the men in his regular gang cannot be relied on for such work, the roadmaster should see that several native laborers are sent to him. The responsibility, however, does not rest entirely on the track foremen. It is equally necessary that a slow order or flag be respected by the enginemen. The flag is very generally respected, but the slow order is apt not to be so closely followed. On many roads most trains will pass over a piece of track on which a 15-mile order is in effect at from 20 to 30 miles per hour. Although the track foremen may report the matter to his superiors, the enginemen seldom hears of it unless there is a derailment, when the blame is placed on him. By ignoring such infractions of the rules, the superintendent shares responsibility with the engineman for any accident resulting.

A REPORT of the annual convention of the Roadmasters' and Maintenance of Way Association and the programme of the meeting of the American Railway Bridge and Building Association, to be held in St. Louis next month both appear elsewhere in this issue. Like the American Railway Engineering Association, these organizations are of great value to men engaged in the various branches of maintenance of way work. Their annual conventions are a clearing house for experiences and ideas gained on many roads in all parts of the country. The standards of maintenance work are being raised. At the same time the demand is becoming stronger for more results with the expenditure of less money. The labor problem is becoming more serious. New labor-saving devices are being introduced in all branches of the work. Alert and progressive roadmasters and master carpenters are enabled to get a point of view beyond the limits of their own divisions, and to keep in touch with current developments by their association with other men at these conventions. Although they may be able to handle their present work satisfactorily without the broader outlook thus gained, they cannot become eligible for larger duties unless they are fully abreast of the times. In addition to the privilege of attending the membership conventions in such an organization affords an opportunity for committee work, which is very valuable both to the individual members of the committees and to the association, as a whole, for the field for original investigation is large. It is to be regretted that all committees do not make the most of these privileges, and that lack of interest, frequently covered by the plea of lack of time, sometimes prevents the attainments of the most valuable results. The members who secure the greatest benefit from the association is the one who enters into its activities as fully as his duties will allow, and railway companies are fast learning that they can well afford to allow their men to participate in such work.

RAILWAY managers are becoming aware of the advantages to be derived from impressing on employees in the maintenance of way department the value of both the labor and the material in their charge. The general manager of the Chicago Great Western has recently sent out a circular to the employees of that road, informing them of the new, second hand and scrap value of the tools they use. The Chicago, Burlington & Quincy is revising its standard tool order book to include the prices of all material, so that the foremen may know the value of the material they want at the time they are ordering it. The average man will not willfully destroy the property of his employer, and carelessness in the use of tools results largely from a lack of realization of their value, since the foreman can secure others by simply making requisition on the roadmaster. The necessity for a more thorough consideration of the value of labor is also beginning to be realized. When two firemen are working under similar conditions with the same number of men, and one accomplishes more than the other, it is usually concluded that the second man is not getting the most out of his labor; but he has no way of knowing this until his attention is called to it. The supervising officer may notice the difference, but his conclusions are merely the result of general observation unless he keeps some sort of a comparative cost record of the work of his foremen. Many men keep such records for their own information, and it is to

be regretted that the practice of doing so is not more general. We desire to publish descriptions of the different methods used and the results obtained for the information of those who are planning to inaugurate some such system in connection with their work, and, to secure such descriptions, we are conducting a contest on "Methods of Keeping Cost Data in Maintenance of Way Work." Contributions to this contest should be sent in at once, as it closes October 1. Prizes of $25 and $15 will be awarded the best two papers, and regular space rates will be paid for all other contributions accepted. All papers should be sent to the Civil Engineering Editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, before the date of closing.

WHAT IS THE MATTER WITH THE ROADMASTER?

Temple, Tex., August 26, 1911.

To the Editor of the Railway Age Gazette:

What is the matter with the roadmaster, and why does he need so much advice on how to handle his work and how to treat his men? Why not hand out tips to trainmasters on how to handle conductors and brakemen? Or hints to master mechanics on how to promote efficiency and get the most work out of enginemen and firemen? Also help out the bridge, building and water service by a few well chosen remarks? And while you are at it, give Mr. Store Department a few short-arm jabs.

Why make chalk of one and cheese of another? It can't be possible that the track department is the only one that is not perfect.

Why take it for granted that the section foreman is different from any other man and has to be handled in some peculiar manner to get work out of him?

Are our railways better today than they were 20 years ago? If so, who made the improvement? Are our railways as good as those in other countries, and do we haul freight and passengers as fast and at less cost? If so, why not give the section foremen and roadmasters credit for knowing their business and doing good work? If they are doing good work why do they need so much advice as to how it should be done?

Sam Lincoln,
Roadmaster, Gulf, Colorado & Santa Fe Railway.

THE above letter merits an answer. It indicates a misunderstanding regarding the purpose of the Maintenance of Way Section, which may exist in the minds of others besides Mr. Lincoln.

The reply to his question as to why the columns of the *Railway Age Gazette* are not used as a medium for handing out "tips" to trainmasters and "hints" to master mechanics is that they are being so used. They have been for some years. For example, in May, 1909, this paper offered a first prize of $75 for the best article, and a second prize of $50 for the second best article, on "How to Be a First Class Trainmaster." A large number of contributions were received from trainmasters and published in the spring of 1909. They contained all manner of "tips" to trainmasters, not only on how to handle conductors and brakemen, but on how to perform other duties. As to "hints" to master mechanics and other mechanical men, they have been "handed out" in almost every issue of the *Railway Age Gazette* for years, and have been particularly abundant in the Shop Section, which is published in its first issue of each month. As to the bridge and building service, a number of contributions which were drawn out by a "Bridge Kink" competition were published in the Maintenance of Way Section for August 18, 1911, page 330, and we hope to be able from time to time to publish others of the same sort.

The foregoing shows that Mr. Lincoln has gone astray in assuming that we are trying to make chalk of one class of railway men and cheese of another. This section was not started, as he seems to think, on the assumption "that the track department is the only one that is not perfect." It was started on the assumption that the track department, like all other branches of railway service, and, indeed, all branches of every industry, is not 100 per cent. efficient, and therefore can be improved by turning the light of discussion on its imperfections. The aim and desire was to make this section a clearing house for the ideas and experience of those concerned in engineering and maintenance work. It was believed that its establishment would be welcomed, that railway men would make generous use of its columns to tell the results that they have got or that they believe could be got by the use of different methods, and that it would thus become a useful instrumentality in promoting railway efficiency.

The results thus far have been gratifying to the *Railway Age Gazette*. We believe they have also been so to most of the readers of this section. The large number of contributions on a variety of engineering and maintenance subjects that has been received is the best indication possible of the interest that the section's readers are taking in it. It shows that roadmasters in general recognize the fact that methods of maintenance work can be improved; the more efficient they are the more keen they are to receive suggestions as to how their work may be better done. Mr. Lincoln writes with a vigor and pungency that indicates he is a man of ability, who could probably offer some good efficiency suggestions himself. We are sure that his fellow roadmasters would much rather receive them than to read his criticisms of the "kinks," "hints" and "tips" offered by other contributors.

CONSTRUCTION KINKS.

THE opportunity for developing originality and ingenuity is possibly even greater for the man engaged in construction work than for the one concerned with maintenance of track and structures. Re-alinement, second track, grade reduction and yard extensions have come largely under the supervision of the maintenance of way department, until the present practice on most roads is for the local division organizations to handle all work except the construction of new lines. Construction work in the future will consist more and more of the improving of existing lines rather than the building of new ones. Local division men must handle construction work at intervals in connection with their other work, but usually they do not become specialists in construction details. Many kinks are devised by them to get out of tight places which the originators never think of as kinks.

If the work to be done consists of reconstruction of an existing line or the building of additional tracks, arrangements must be made to handle the traffic without interruption, which often introduces more difficulties than the actual construction work. Many short methods are developed in connection with the grading; the storing and handling of material may be arranged to facilitate the progress of the work; quick methods may be found to lay or move construction track or turnouts; or traffic may be handled safely by clever arrangement of the tracks or by installing some simple but effective form of temporary protection. In construction work on new lines a somewhat different class of problems is met. The equipment used in constructing the roadbed may be of various types; the problem of handling supplies may become very serious while there is no revenue traffic to handle.

The lack of transportation facilities makes impossible many methods applicable to work on an existing line. Each of these special difficulties gives rise to a number of kinks. We want to draw out as many kinks of both these classes as possible, and we announce a contest on construction kinks, which will include all devices or methods resulting in a saving in time or labor, or a gain in efficiency, and adapted to handling any feature of construction or reconstruction work, from the clearing of the right-of-way to the ballasting of the completed track, except those relating to bridge and concrete work, which will come within the limits of another competition. Prizes in this construction kink competition of $25 and $15 will be awarded for the best two contributions, and all other contributions that are submitted in the competition are printed and accepted will be paid for at our regular space rates. All contributions to be considered must be in the hands of the Civil Engineering Editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than November 1.

Letters to the Editor.

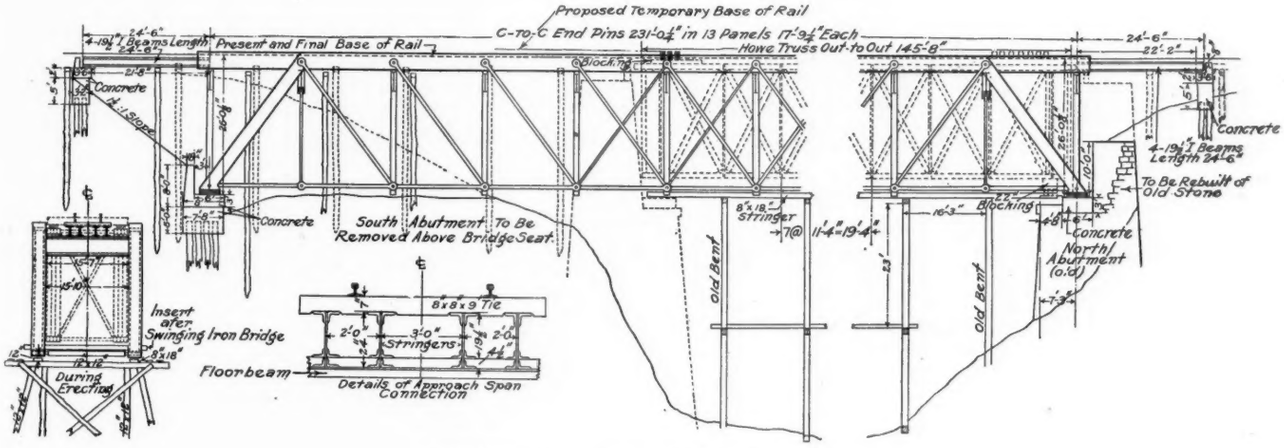
A METHOD OF ERECTING SMALL BRIDGES WITH DERRICK CARS.

LOUISVILLE, KY., September 4, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

One of the many kinds of work which can be handled to advantage with a derrick car, similar to the one described in the issue of the *Railway Age Gazette* of July 21, is the erection of small and medium sized bridges. Such a car has been used recently in replacing a number of bridges with heavier structures on the Louisville division of the Pennsylvania Lines West, of which the work done near Grayford, Ind., is typical. At this point it was necessary to replace a deck Howe truss 145 ft. 8 in. long out to out, having trestle approaches at each end, with a deck Pratt truss 231 ft .0¼ in. long having I-beam approaches.

In handling this work those parts of the north and south abutments above the new bridge seat were first removed and new bridge seats built. A new pier was built for the south end of the new span and new abutments were also built for the approach spans. Two additional floor beams per panel were then inserted in the floor of the Howe truss. This truss was raised 22 in., the stringers and truss removed, and the rails spiked to the floor beams.



Replacing Howe Truss With Steel Spans.

The floor beams of the Howe truss were then raised 8 in. on blocking between the beams and the top chord, leaving the rail 11 in. high, and a run-off was built at each end. The wooden trusses were then drawn in to 15 ft. 7 in. out to out. False work sufficient to carry the new span during erection was built, and the new truss erected. Ties were placed on the new deck of the truss, and the approach spans placed. The wooden floor beams of the Howe truss were then removed and the rails lowered to final position on the ties of the Pratt truss, after which the old Howe truss was torn down and the false work removed.

This work was handled by the regular division forces. All material was handled by the derrick car, both in unloading and in erection, and no heavy equipment was required. Under the more common method of handling such problems, false work heavy enough to carry the traffic would have been built and the track supported on this false work while the old structure was dismantled and the new one erected. In this case, however, it was only necessary to build false work to reach the lower chord of the bridge and heavy enough to carry the bridge without any live load.

D. B. JOHNSTON,
Division Engineer, Pennsylvania Lines West.

BALTIMORE & OHIO MOUNTAIN DIVISION IMPROVEMENTS.

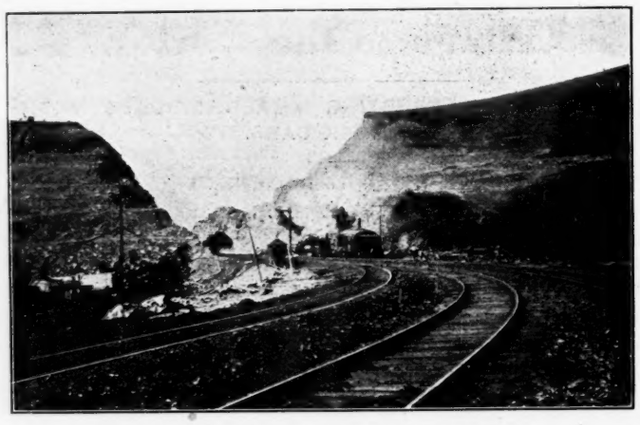
The Baltimore and Ohio has two crossings of the summit of the Allegheny mountains, one between Cumberland, Md., and Connellsville, Pa., on the line to Pittsburgh and Chicago, and one between Cumberland and Grafton, W. Va., on the line to Cincinnati and St. Louis, and Chicago via Wheeling. The slopes on this range are particularly steep, and the problem of securing an easily operated line has always been a very difficult one. The amount of traffic handled in this territory, of which a large percentage is coal from the extensive deposits in West Virginia and Pennsylvania, is so great, however, that it is imperative that ample facilities for intensive operation be provided. A great many improvements have been made on both the divisions which cross the summit in the 12 years since the reorganization of the road, but the principal work has been done since the record tonnage of 12¼ billion ton miles was handled in 1907. The bulk of the tonnage over the mountains is eastbound, and most of the recent work has been undertaken to facilitate the movement of that traffic. Following 1907, it was decided to increase the capacity of the line by at least 50 per cent., and to that end $5,000,000 has already been spent on improvements between Baltimore and Grafton alone, and work now under way and being planned will cost from two to three times that amount.

Heavy third track work is being done on the Cumberland division between Cumberland and Grafton, which involved the elimination of several tunnels and other important changes. A large part of this work is now nearly completed. The accompanying map and profile show the characteristics of this portion of the line, and the track diagram shows the changes made in the recent improvements. In the 44 miles between Cumberland and Altamont, the highest point on the system, the grade is uniformly rising, the difference in elevation being 1,979 ft. A little more than 14 miles of this distance is on a grade exceeding 2 per cent., and the curvature is high over the entire division. From Altamont to Terra Alta, about 19 miles, the line dips and rises again to a summit 69 ft. lower than Altamont. The maximum grade is a little more than 1 per cent. From Terra Alta to Grafton, 38 miles, the line drops 1,560 ft. with a sag at Rowlesburg and a peak at Blaser. About 14 miles of this distance is on a descending grade 2 per cent. or greater, and nearly four miles, from Rowlesburg to Blaser, rises on a grade equally severe. Six tunnels were included in the section from Cumberland to Grafton one over 4,000 ft. long, four averaging more than 500 ft. long, and one 310 ft. long; a total length of over 6,500 ft. These were all for double track except the Kingwood tunnel, the longest of the six, which was operated as a double track gauntlet. With the exception of this tunnel there was a

continuous double track over the whole section, and in several places there were considerable lengths of third and additional extra track.

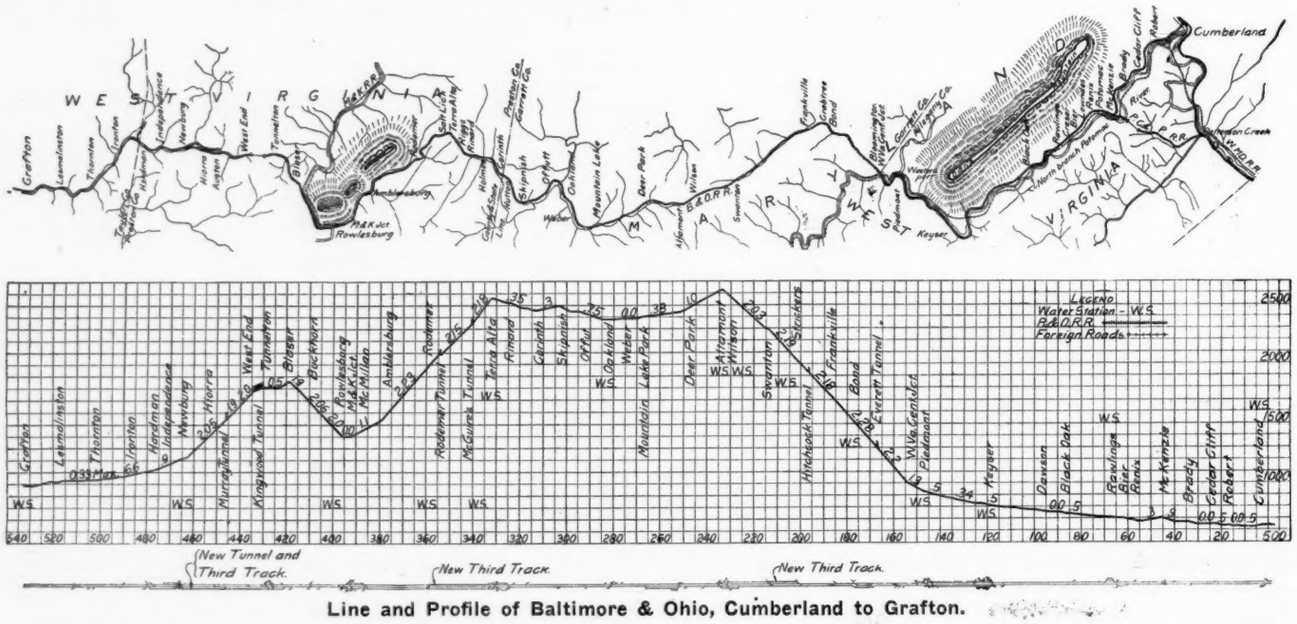
While it was not possible to reduce the long, heavy grades over the mountains, it was feasible to reduce the undulating grades on the tablelands and to improve the grades approaching the foot of the heavier grades to a maximum of 0.5 per cent. compensated. This made it possible to increase the actual tonnage of the trains and the distance over which a single engine could haul its full tonnage, and also reduced the mileage of the pusher engines, thereby improving operation. By the use of Mallet engines the heavier trains are operated over those steep grades which could not be improved.

The sections where grade revisions have been made are between the east end of the new Grafton yard and the foot of the Newburg grade at Hardman; between West End and Blaser, which includes the Kingwood tunnel; and from Corinth to a point just east of Hutton through what is locally known as "58 Cut." At the first of these sections the improvement consists of the reduction of the grade from 0.6 per cent. uncompensated to 0.5 per cent. compensated, which permits a full rated train to pull out of the Grafton yard and proceed eastbound to the foot of the Newburg grade where a helping engine is attached to the train.



Shooting East Portal of McGuire's Tunnel.

Over the second section a change of line and grade has been made for a length of about four miles, the grade being reduced from 1 per cent. uncompensated to 0.5 per cent. compensated over the summit at Blaser. Over the third section the grade has been reduced from 0.7 per cent. uncompensated to 0.4 per cent. compensated for a distance of practically 2.3 miles. This lighter grade was adopted east of Rinard, where there is a filling-in yard, as a 0.4 per cent. train could be operated with only one pusher over the heavy grade between Deer Park and the summit at Altamont.



Line and Profile of Baltimore & Ohio, Cumberland to Grafton.

West Portal of Rodemer Tunnel, Immediately Before Shot.

In addition to the changes in grade a new third track was built on the steeper grades and at points where operation was necessarily slow. In addition to the third track work a reservoir was built at Newburg to furnish a stable water supply and a new classification yard was built at Grafton.

The new third track was in three sections: 2½ miles between Swanton and Strickers, an extension of the existing third track down the heavy grade east of Altamont; 5¼ miles between Rodemer and Terra Alta, completing the third track on the rising grade between Rowlesburg and Terra Alta; and 8½ miles between Blaser and Newburg, covering the section of 2 per cent. grade descending from Blaser. When the work is completed there will be three tracks on all grades, 2 per cent. or heavier adverse to eastbound traffic, and a considerable mileage of third track on the heavy grades westbound, all of which will ultimately be three-tracked.

The work between Swanton and Strickers included a slight change in alinement to reduce the amount of excavation, and also involved the extension of three small structures over Crab Tree creek, but presented no special difficulties.

TUNNEL ELIMINATION.

The section between Rodemer and Terra Alta included Rodemer tunnel and McGuire's tunnel, which were eliminated

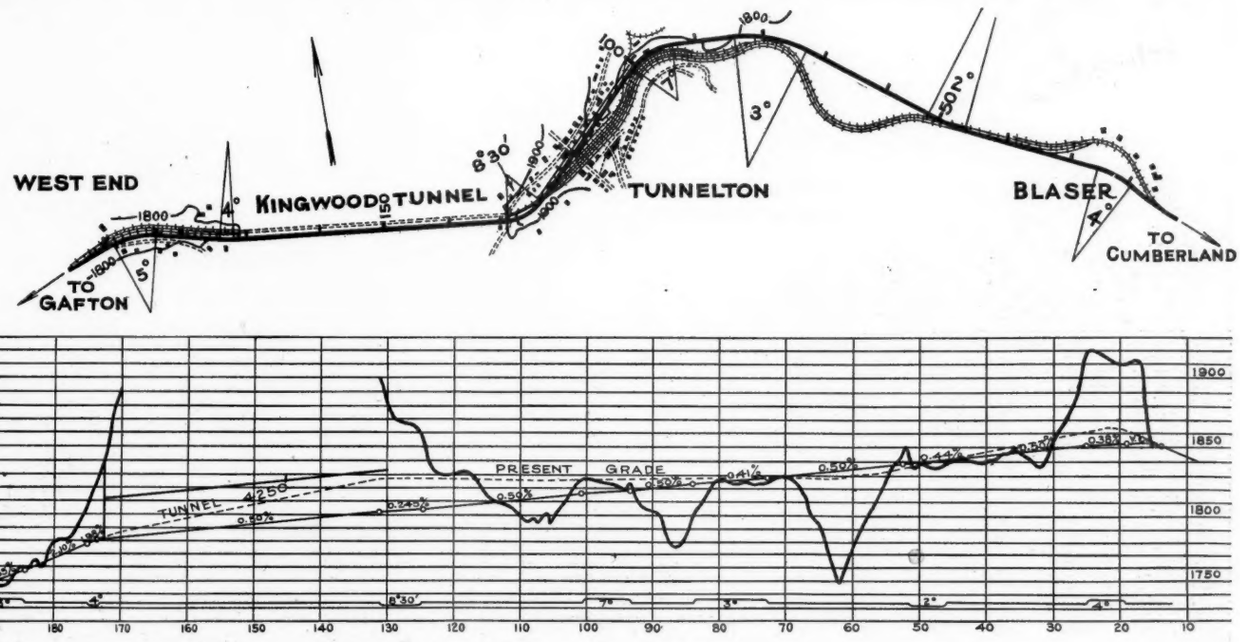
Mule Carts Working in Graveyard Cut.

in connection with the third track work. Murray tunnel in the Blaser to Newburg third track section, and Everett tunnel below Strickers, on the "17 mile" grade were also eliminated, the methods employed in all four cases being similar in the essential features. The principal reason for eliminating these tunnels was that they did not provide sufficient clearance to allow the operation of the largest Mallet locomotives through them. The tunnels were all double track and in the case of the three included in the new third track work their elimination was also necessary in order to provide the additional width for three tracks.

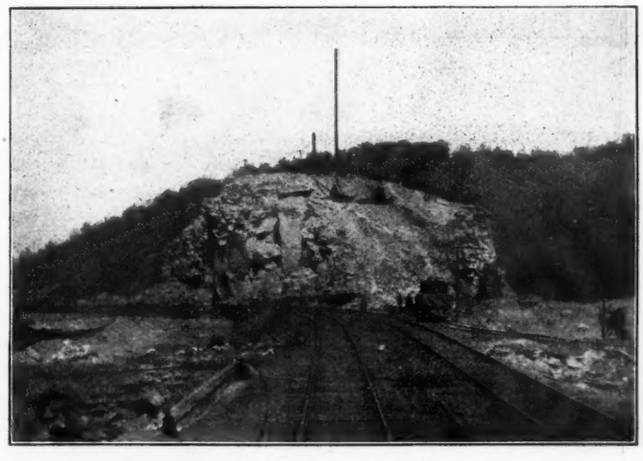
The method of removing the tunnels was in general to make a steam shovel cut over the existing tunnel, dynamite the tunnel lining and remove the remaining material, leaving an open cut. All of the tunnels were located on heavy grades, and it was not considered safe to operate single track at these points during construction work on account of the danger of the heavy trains meeting on the single tunnel track. For this reason it was necessary to provide run-arounds to carry all traffic during the removal of the tunnel lining. In each case a double track cut was made alongside the tunnel, a wall of rock averaging about 15 ft. thick being left adjoining the tunnel wall. The line was then shifted to carry all traffic through this cut, and excavation was started above the tunnel. This cut was carried down to about 10 ft. above the arch ring. The material in all these cuts was sandstone in ledges, with layers of shale and some coal. All of the excavation was handled with steam shovels, the rock being removed in dump cars hauled by dinkey engines, and used in bank widening for the third track, or wasted in dumps on the hillsides.

The top and side of the tunnel lining, with the overlying shell of rock, was blown down by a charge of dynamite. This charge was first placed horizontally on the springing line of the arch, but it was found that better results were secured by drilling the charging holes diagonally downward from points a little above sub-grade. These holes were placed 6 ft. apart and were staggered, one being started 1½ ft., and the next 2½ ft. above sub-grade. They were driven to a depth of 3 ft. below sub-grade on a slope of one to one. Each charge consisted of thirty to forty ½-lb sticks of 40 per cent. dynamite. A length of tunnel of about 160 ft. was blown down at each shot. The three tunnels, Everett, Rodemer and McGuire's, were each more than 500 ft. long and required a maximum cut of about 130 ft. The approximate yardage moved was 175,000 at Everett, 250,000 at Rodemer, and 290,000 at McGuire's.

The section of third track work between Rodemer and Terra Alta involved no particularly interesting features besides the tunnel elimination. One cut near Rodemer, which was inaccessible to the steam shovels, was handlel by mule cars. The accompanying illustration shows two carts loading on different ele-



Grade and Line Revision; West End to Blaser.



Cut at Murray Tunnel Before Completion of Third Track.

vations in this cut. About 10,000 yds. of rock were moved in this manner.

KINGWOOD TUNNEL.

On the section between Blaser and Newburg the work included the driving of a new double track tunnel parallel to the present Kingwood tunnel, the revision of alinement and grade between Blaser and West End, and the elimination of Murray tunnel. The old Kingwood tunnel is 4,138 ft. long and is on a 1 per cent. grade. The new tunnel is 80 ft. south of the old one, is 4,250 ft. long and on a .5 per cent. grade, the elevation at the westportal being approximately the same as the old. This makes the elevation at the east portal about 24 ft. below the old grade and to get the tracks on the same embankment again, the alinement is revised, as shown in the small drawing herewith. This

Cut Above and Alongside Existing Tunnel.

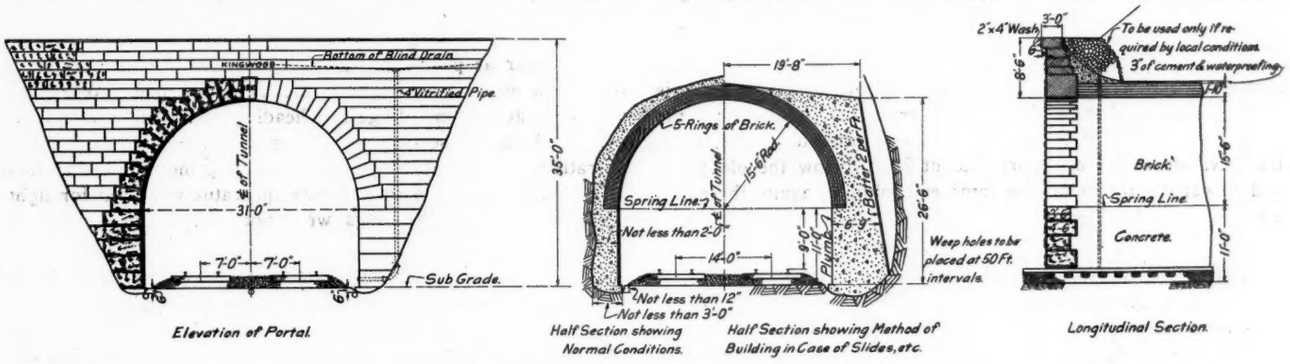
arrangement allows pushers on eastbound trains to cut off at West End, shortening the pusher mileage; it eliminates considerable curvature through Tunnelton and Blaser, and reduces the grade slightly.

The new tunnel was driven from three shafts and the west portal. Shaft No. 1 was approximately at the location of the east portal, and was driven first to allow work on the heading to proceed while the approach cut was being made. Shaft No. 2 was approximately in the middle of the tunnel's length, was 175 ft. deep, and from it headings were driven in both directions. Shaft No. 3 was about 800 ft. from the west portal, two headings being driven from it also. The material encountered throughout the length of the tunnel was shale, with occasional ledges of harder stone. It could be blasted by a light charge, and the material was hauled to the shafts in small cars drawn by mules. The first heading averaged about 8 ft. in height by 16 ft. in width. This section was somewhat irregular, as it was necessary in places to increase or diminish the height in order to secure a good roof, and the width varied considerably on account of irregular drilling. The bottom of the heading was kept as near as possible at the grade of the wall plates, which is 17 ft. above the sub-grade of the finished tunnel. An attempt was made at first to enlarge this heading to the full width of the completed tunnel section, and place the timbering at a single operation, but the effort was abandoned, principally on account of the poor ventilation, as gasolene apparatus was used for lighting, and the small headings were hot and smoky. After the timbering was stopped the small headings were rapidly advanced westward from the east portal shaft, eastward from the west portal, and both ways from the two interior shafts, until a continuous heading was completed. The enlarging and timbering were then resumed, and the original heading was widened at the bottom to allow the placing of the wall plates 35 ft. 8 in. face to face. These were placed, blocked and wedged, and the roof blasted down to as near the contour of the tunnel arch as possible. Compressed air for operating the rock drills was furnished by a compressor at the east end, and piped over the mountain to the intermediate shafts and to the west portal. The timbering in this heading consisted of 2-in. lagging on 12-in. x 12-in. arch rings placed 4 ft. center to center, or 2 ft. in some cases

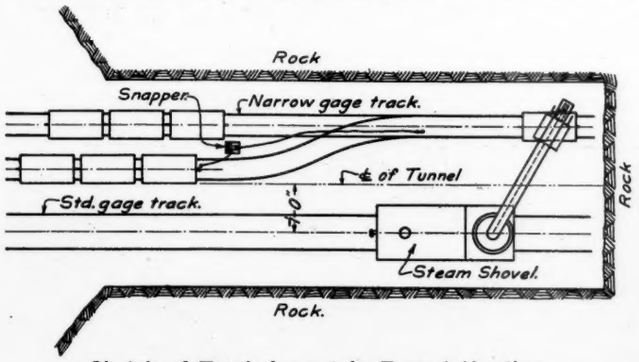
where the material required additional support. The arch rings rested on 16 ft. wall plates.

While this heading was being driven a steam shovel was cutting the approach to the east portal and working on the cuts for the revision of line through Tunnelton. As this work adjoined the operated line, blasting had to be done with light charges to prevent blocking the tracks. This excavation was handled with Western dump cars and was used for filling through the town of Tunnelton.

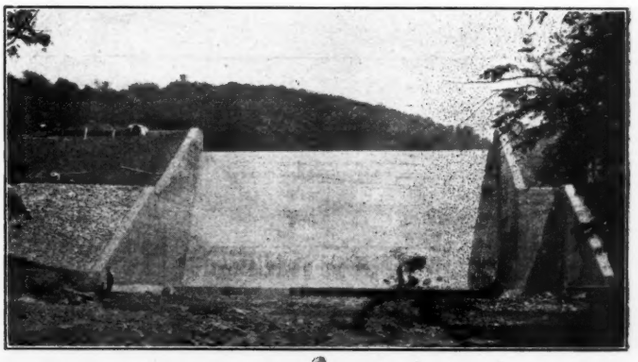
The first heading is now being enlarged to the full tunnel section by 60-ton Marion shovels, one working in from each portal. The face of the rock is blown down as near the standard section as possible, and irregularities are trimmed up by hand. The shovel runs on a standard gage track, as near one wall as convenient, and loads the material into 4-yd. dump cars running on a narrow gage track parallel with the shovel track, as shown in the accompanying sketch. A dinkey engine backs in a train of empty cars on the middle track, and a Byers snapper located near the switch pulls one car at a time into place alongside the shovel and out on the other track when loaded. One man operates the switch and two others ride the cars to apply the brakes as needed. When a train of loaded cars is ready another dinkey engine pulls them out. The snapper in use is very similar to an ordinary hoisting engine except that it is geared for high speed. It has a double drum with a line extending in both directions, one used for pulling in the empties and the other for pulling out the loaded cars. The engine is operated on compressed air. The steam shovel and the dinkeys that enter the tunnel burn charcoal to avoid the effects of gases given off by other fuels. An attempt was made to use coke for this purpose, but it was not successful.



Masonry Plan of New Kingwood Tunnel.



Sketch of Track Layout in Tunnel Heading.



Spillway and Lower Slope of Dam, Newburg Reservoir.

The tunnel walls will be of concrete up to the springing line of a minimum thickness of 2 ft., and the arch will be of 5 layers of brick turned to a radius of 15 ft. 6 in. A small quarry was opened up near the west portal to supply stone for packing

Newburg Reservoir; Baltimore & Ohio.

over the arch. A concrete plant at each end of the tunnel supplies concrete for the walls. A Brown hoist handles the materials to the mixer, and another one places the forms in the tunnel and handles the buckets of concrete into the forms.

To improve the air conditions in the existing single track tunnel, a ventilating system was installed which drives a current of air through the tunnel at a rate which is varied to suit the speed of the train. The fan house for this ventilating system is located at the west portal and can be seen in the photograph of the work at that end. The heavy covering of 4 in. timbers supported on a framework of 12-in. x 12-in. pieces was built around the house as a protection against shocks from blasting in the new tunnel. An interlocking tower near this point was protected in the same manner.

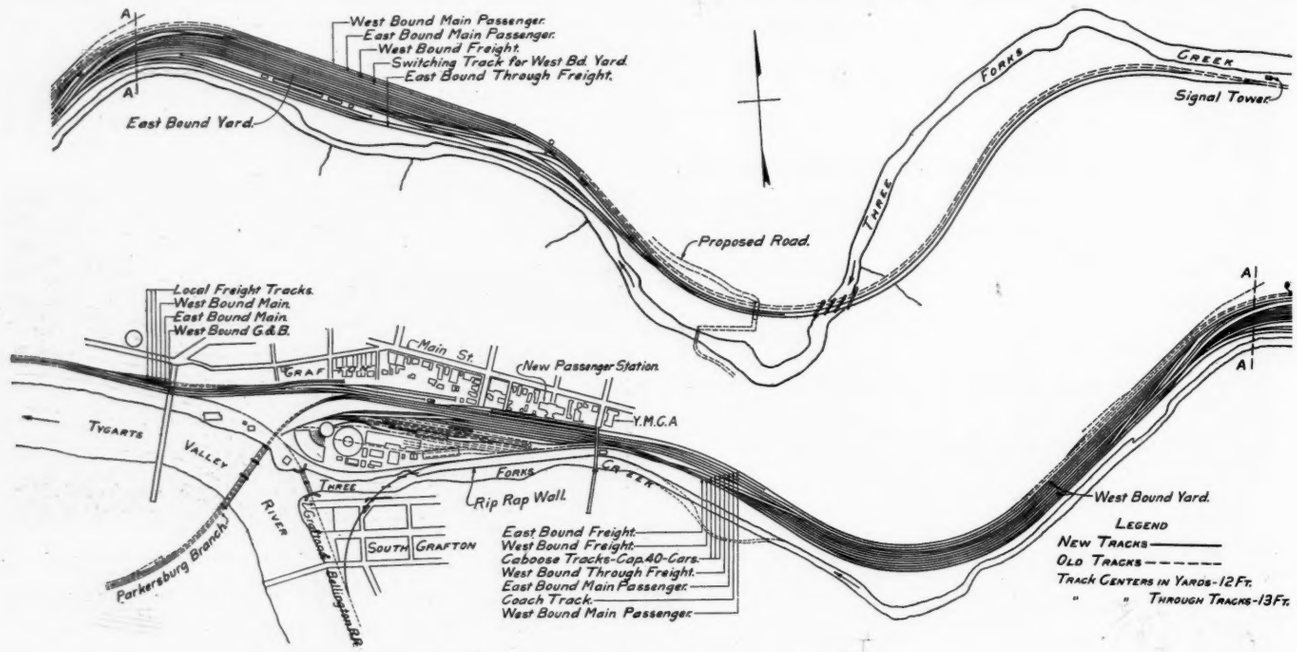
The material from the west tunnel heading was hauled about ¾ miles west and wasted in a deep ravine. It was necessary for the narrow gage construction track to cross the main line, and this crossing was protected by a temporary installation of standard signals and derails controlled from a 4-lever section of an old mechanical interlocking plant installed on the track level near the crossing. The machine was not covered, but an operator's cabin was provided and a man was kept constantly in charge. The derails on the construction track were normally closed and the main line signals clear. Before the derails could be opened the signals had to be placed at danger.

NEWBURG RESERVOIR.

Near Newburg at the west end of the third track work a 30,000,000-gal. reservoir has been provided. The problem of securing engine water during the dry season over this mountain division has been at times a very serious one. It has frequently been necessary to run regular water trains for considerable periods, as the wells from which the supply was drawn were intermittent. The new reservoir is located on Raccoon creek and is fed from a catchment area of about 1,200 acres. The dam has a concrete core wall and spillway, the filling being of clay, deposited in 6 in. layers, sprinkled and rolled. Stratafied and seamy rock was not allowed in the fill. The concrete wall was benched into the solid rock about 38 ft. below the top of the dam. The width of the fill at the top is 9 ft. 11 in., and the slopes on both sides are 2 to 1, with 6 ft. and 7 ft. berms about half way down the upper and lower slopes, respectively. The spillway is 75 ft. wide and the crest is 34 ft. high. The water inlet is 14 ft. below the elevation of the spillway, and is near the toe of the upper slope. The supply is controlled by a valve in a valve box on the dam. A 6-in. gravity supply pipe leads down to a storage tank at Newburg, the fall from the outlet to the storage tank being about 140 ft. The details of the design of the dam are shown in the drawing on the opposite page.

GRAFTON YARD.

One of the most important steps in increasing the capacity of the road across the mountains was the installation of ample terminal facilities at Grafton. This is a junction point for two branches and a division point on the main line. There was an insufficient number of tracks in the yard at this point before the beginning of the present improvement and the necessary switching had to be done largely on the main line. To eliminate the congestion occasioned by such switching movements and to prepare for the increased volume of business made possible by the other improvements, a yard of adequate size and improved connections to the branches were designed and are now practically completed. The location of the yard was made somewhat difficult on account of the fact that the entrance to Grafton is through a narrow winding valley with steep slopes on both sides through which flows a small mountain stream. The bed of this stream was changed three times during the construction of the yard, and was finally disposed of south of the principal part of the yard, with a single crossing near the east end. About 1,250 ft. of riprap wall was built near the west end of the yard as protection against bank erosion. The high curvature throughout the yard is a very noticeable feature of the layout, but, because of the topographical features, was unavoidable without involving excessive cost. The classification yards are operated as level yards, being of the push and pull type. The eastbound classification yard has ten tracks with a capacity of 40 cars each, the westbound seven tracks holding 60 cars each, and, in aldition to these, there are four engine tracks for ten engines each, and facilities for repairing 90 cars. The main line tracks are 14 ft., and yard tracks 12 ft. center to center. Turnouts from ladders are No. 8. The yard is laid with 85-lb. second-hand rail. Two new Y connections with the Grafton & Bellington branch were provided to eliminate back-up movements of branch trains in reaching the passenger station. The additional tracks over Three Forks creek near the east end of the yard required an extension of the masonry in the substructure of the existing deck girder structure. To care for highway traffic it was necessary to



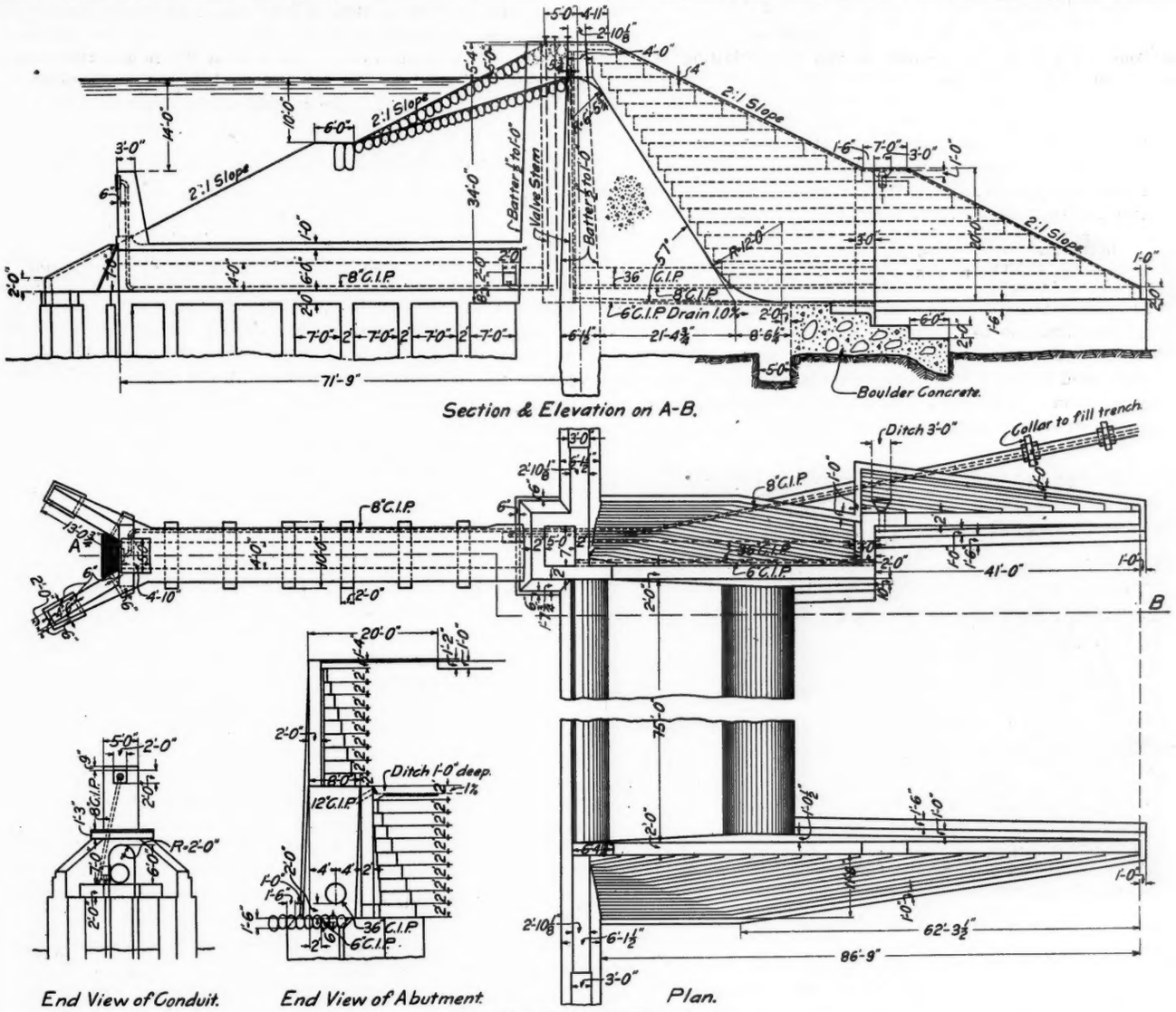
Layout of Grafton Yard; Baltimore & Ohio.

change the location of a road just west of the stream crossing and to build a new steel highway bridge over the tracks.

Incident to the work at Grafton a new station was built, which was opened August 22, 1911. The building is three stories high, of concrete construction with terra cotta and compressed brick facing, and a copper and composition roof. On the first floor, or track level, are the baggage and express offices, division telegraph office and emmigrants' quarters. On the second floor, or street level, are the main waiting room and ticket offices. On the third floor are offices for all division officers. The architecture of the building is modern renaissance. The interior is trimmed throughout in quartered oak. The floors in all public rooms are of marble and tile. The general waiting room, women's retiring room, men's smoking room and toilet rooms are finished with marble wainscoting and plastered beam ceilings. A broad covered stairway of ornamental concrete leads from the track level to the main waiting room and two hydraulic freight elevators handle baggage and express between these two levels. Separate eastbound and westbound platforms, 600 ft. long, covered with umbrella sheds, are provided.

The end of the third track at the east end of the yard is controlled by a 28-lever mechanical interlocking machine; and the junction of the two branches, the end of the fourth track and the crossings of freight and passenger tracks over the branch tracks are controlled by an electro-pneumatic interlocking plant containing a 72-lever machine. Other signaling work in progress between Cumberland and Grafton includes a 28-lever mechanical plant at the east end of the third track at Bond; a 24-lever mechanical plant at the west end of the same track; a 24-lever mechanical plant at the east end of the Strickers third track, and a 32-lever mechanical plant at the east end of the Blaser third track. Interlocking plants will also be installed at the west end of the Kingwood tunnel, at the helper station at Hardman, and at the helper station at Rowlesburg, but definite plans have not been completed for these plants. In the signaling installations all high signals are power operated, semi-automatic, three-position, upper quadrant. Dwarf signals are two-position.

The improvement work on this division was planned under the direction of F. L. Stuart, chief engineer; Earl Stimson, chief engineer maintenance of way, and J. T. Wilson, district engineer.



Dam for Newburg Reservoir.

The *Proceedings* of the seventh annual meeting of the Wood Preservers' Association includes a list of wood preserving plants in the United States. It shows that 86 plants are now in operation owned by 60 companies, and situated in 31 states. Of these plants 64 are operated by 43 private companies and 22 are operated by 17 railways. The plants report the use of various processes of preservation as follows: Creosote, 26; Bethell, 16; Burnettizing, 14; Lowry, 13; Card, 5; Rueping, 4; Kyannizing, 2, and Allardyce, 1. The number of plants built during the past four years is given as follows: 1907, 13; 1908, 7; 1909, 9; 1910, 4.

TRACK DRAINAGE COMPETITION

FIRST PRIZE.—POROUS TILING IN WOODEN TROUGHS.

BY J. F. MCNALLY,

Assistant Superintendent, Atchison, Topeka & Santa Fe.

When the Santa Fe inaugurated fast passenger and freight service, with heavy locomotives, we found it necessary, in order to maintain perfect track, to experiment on draining cuts and fills. We first used 4-in. porous tiling, at the ends of ties, about 2 ft. deep, and had section men put it in without stakes set by engineers We found after the tiling had been in from one to two years that the heavy traffic caused it to become misplaced and in many instances the ends of the tiles would stick out through the surface, as a result of the heaving of the ground underneath. We then experimented by putting tiling along the bottom of the ditch 2 ft. deep, 4 to 6 ft. from the rail. This was not a success, as it was too far away from the roadbed to give the proper drainage. Then we placed the tiling 18 in. from the ends of the ties. The section men dug test holes 30 to 50 ft. apart, and the engineers ran levels and marked on the base of rail the depth that the ditch was to be cut, giving the tiling enough fall to maintain perfect drainage.

We used old fence boards to make a V-shaped trough with broken joints. This trough was laid in the bottom of the ditch and the drain tiling placed in it.

Water Running From Cross Drain in Fill.

The first experiment was made in 1905. Since then we have laid all tiling in such a trough, using fence boards or car siding for lumber. After laying the tiling, the ditch should be filled with cinders or ballast of any kind. The tiling cannot become misplaced, as the trough that is placed in the bottom prevents it from heaving up. Instead of using 4-in. tiling we have adopted 6-in., and find that it gives much better results.

The accompanying cut shows a section of track laid at the foot of a one per cent. grade, with 90-lb. rail and Weber joints, with one foot of ballast under the ties. Each tie has two tie plates. Both passenger and freight trains make very fast time over this piece of track, with heavy equipment. This section of track is located in a very rough and hilly country, in a cut which is underlaid with yellow clay, soapstone, and with springs and seepages from the hillside. We placed 6-in. drain tiling, one row of tiling on each side of track, 18 in. from ends of ties. First we had the trough made out of old fence boards, had section men dig test holes 30 ft. apart, then we had engineers run a grade line and mark on the base of rail every 30 ft. the depth that the ditch was to be cut. Then section men placed the trough as described above. Tiling was placed in the fall of 1908, and we have had no trouble maintaining this track since that time. There is water running out of the tiling every day of the year.

In many instances wet banks can be drained by using old engine flues. Punch holes in the engine flues, plug one end of the flue and drive it into the bank far enough so that it will reach the center of track on each side. In some places we have experienced very good results by putting in rock drains, starting at the bottom of the dump, if necessary making the ditch under the track and laying a rock drain. This will stop bad slides, but where the slides do not continue to the bottom of the dump, tracks can be drained much more cheaply by using engine flues.

SECOND PRIZE—TILING AND CROSS DITCHES.

BY S. B. PETER,

Roadmaster, St. Louis & San Francisco.

The following is our experience in trying to maintain track through a wet cut where sub-grade consisted of a mixture of potters' clay and soapstone. When the road was new it was ballasted with about six inches of stone, broken with napping hammers, the largest pieces being supposed to pass through a 2-in. ring. Sufficient stone was broken at the ends of ties to make a good shoulder, and it was thought that trouble with this piece of track was ended. After a long wet spring the following year the shoulder had about all been used to tamp up the joints, and had pounded down into the mud, forming pockets that held water from one rain until the next. Side ditches were made deeper in an effort to drain the track. This, however, seemed to make matters worse, for as fast as the ditches were made deeper the mud squeezed out from under the track. Eight inches more ballast of the same kind was applied during the second year; but pockets having formed under the joints, the clay continued to squeeze out, making the pockets deeper, and the condition of the track became worse after each rain.

The third year it was decided to tile the cut. Ditches were made one foot from the end of ties, cut as narrow as practicable with tiling spades, and 2½ ft. deep. The grade of track was 0.5 per cent., and the grade of tile was made the same, except at the lower end of cut where conditions permitted a greater fall. Six-inch tile was laid in the ditch, which was then filled with broken stone. Both sides of the track were tiled in the same manner. After the first rain, water flowed from the ends of the tile freely and it seemed that the proper remedy had been applied. The year following, during the spring rains the dirt in the ditches showed signs of heaving; the surface of the track began to get bad, and at the end of the year conditions were about the same as before the cut was tiled.

At the end of two years after the tile was laid, it began to show above the mud in the ditches in a number of places. The ditches had been cleaned twice each year, and the worst places three or four times. It was then decided to try tile placed at the back of the ditch six feet from the rail. These ditches were carried down four feet below base of ties, maintaining the same grade as the track. Lateral ditches were cut at each 15 ft., tapping all pockets. The side of ditch farthest from the track was kept vertical, and the tile laid at back of the ditch. Six-inch tile was used as before, and when the tile was in place sufficient cinders were dumped into the cut to fill up level with top of tie. This tile was applied four years ago, and the track has given no trouble since. The tile should be placed so it will stay in position, and should be deep enough in the ground to drain all pockets that may have been formed.

Different conditions existed on a 15-ft. fill that had been ballasted with crushed rock to a depth of about two feet. This fill had been widened to 20 ft. on top, and track raised 18 in., the material used for widening being mostly clay. The ballast became boxed in, thus holding practically all the water that fell

on the track. When it was undertaken to drain this fill it had been giving a great deal of trouble, having to be surfaced at least once each week. The ballast used in raising track was what is known as chatts or Joplin gravel. The traffic was very heavy, consisting of 20 heavy passenger trains and about 40 freights during each 24 hours.

A lateral ditch was cut every 30 ft. on each side of track, alternating so as to provide a drain at each 15 ft. Ditches were made deep enough to get below the bottom of ballast. In many places this was six feet, and in one place eight feet. These ditches were made just wide enough for a man to work in and were cut into the track until they were of sufficient depth to drain all pockets. There had been no rain for thirty days at time the drains were made, but water ran from the ditches for several hours when they were first opened. The ditches were filled with boulders and the track has given very little if any trouble since.

PROPER SIZE AND LOCATION OF DITCHES.

BY CLYDE L. VAN AUKEN.

Many unforeseen drainage problems arise after the construction of a railway, the solution of which sometimes necessitates the expenditure of a large amount of money. On a new constructed railway, especially any case of bad drainage should have the attention of the engineer in charge, before an attempt is made to remedy the trouble. The need of thorough investigation by an engineer is emphasized by the following experience: Upon the completion of a western line, a large pool of water collected on one side of the track at the intersection of two grades. The elevation of the track was only a few feet above the original ground surface, and the pool of surface water kept the sub-grade soft. The side ditches provided did not drain off the water and the roadmaster ordered the ditch deepened through a cut toward the west. The section gang worked for a week deepening this ditch, but the water failed to run off as expected. Consequent inspection and reference to the profile showed that the ditch was being deepened along an up grade, which, on account of the excessively steeper grade adjacent, appeared to be a moderate down grade. Three hours' work with a team and slip, deepening the ditch in the opposite direction was sufficient to drain the pool.

Just after the completion of a new section of railway, trouble was experienced in a 3 deg. curve which followed quite closely along the foot of a hill. The slope of the hill was gradual, but extended a long distance back from the track, so that the drainage area was quite large. When grading at this place, the ordinary ditches were provided at either side of the track. The grading was very light, consisting practically only of leveling up the ground. The earth at this point was yellow clay, covered with a thin layer of black earth. The ballast used was obtained from a nearby gravel pit; and was not of first class quality, as it contained clay and some gumbo.

After a heavy rainfall the water would gather at the foot of the hill faster than the ditch could carry it around to the tangent at the end of the curve, where a culvert was located. Consequently the water would rise at this point and flow over the rails, and after rainstorms the track would sink into the subgrade very badly and clay would ooze up between the ties. The outside rail of the curve was affected most and the super-elevation would be entirely destroyed. Either of two solutions was practical. The curved ditch could be made big enough to carry the water away; or a culvert could be put in at the place where the water collected. Instead of adopting either of these methods the track at this point was raised and reballasted several times. This resulted in keeping the track in proper shape only until the next rain storm.

The final solution was to enlarge greatly the ditch on the uphill side, keeping as far back from the track as possible. This work was done by teams and slips. After this ditch was enlarged, the track gang was instructed to raise the track at least eight inches. Instead of using the ballast from the local pit, seven or eight carloads of cinders were obtained and unloaded at the worst spot in the track. The lift given at this place was a little over 12 in. This depth of ballast distributed the pressure to the sub-grade more uniformly and stopped the clay from oozing up between the ties.

USE OF STONE AND CINDERS IN WET ROADBED.

BY A. E. PREBLE,

Supervisor, Cumberland Valley.

At the first indication of pumping track the foreman should assign one or two men at once to dig out the pumpers; as one pumper will cause a dozen others. At the first opportunity he should give the entire zone of pumping track a thorough cleaning, digging or forking the material between the cribs down to three or four inches below the bottom of the ties, putting the fit material back and wasting the other. If the drainage is poor, the most efficient and economical plan is to raise the entire stretch on about two feet of cinders as cinders act as an absorbent and hold the water in suspension, allowing it to percolate through slowly and preventing its going direct to the sub-grade, causing pumping.

If pot holes are in the track, where the material pushes out at the sides, these should be treated promptly. If these places are short and the sub-grade is of a clayey or impervious material, the zone of this foreign material should be dug out and filled in with cinder and the ballast put back. If the pot holes are very troublesome where the ballast goes down and the sub-soil comes up, dig out under the ties 3 or 4 ft., and from 11 in. inside the rail to 6 in. outside the ends of the ties and fill in with big stone from 8 to 14 in. in diameter or larger. This stone will set and take the bearing of the tie and at the same time open an underground drain allowing the water to seap through. If there are two or more tracks, a very simple and effective method of draining the grade is to dig out the intertrack space just below the bottom of the ties and lay two lines of old switch timber longitudinally end to end with about 6 in. space between the lines, covering them with old plank, taking cross drains out to the side ditches, about every rail length. This old timber is at the disposal of every foreman and is better than tile drains because if it gets clogged up the plank can be taken off and the drain cleaned out.

REPLACING WET CLAY WITH CINDERS.

BY ROBT. H. ORWIG,

Supervisor, Cumberland Valley.

The usual cause of soft spots in track is clay in the roadbed. Many foremen have discovered this and dug out the clay, filling in the space with large stones. This gives temporary relief, but soon both clay and stones push out in the ditch. Laying tile to correct this condition is useless since they will soon be pushed out of place if stones weighing 100 lbs. or more will not stay in position. One method of correcting this trouble is as follows: Dig out all the clay from under the ties, then fill in with good crisp, locomotive cinder, made from bituminous coal and flooded with water as soon as drawn into the ash pit. This flooding is necessary, for if the cinders are allowed to burn out, the "life" is lost and they lack the most important qualification, porosity.

In digging out the clay it is necessary to go from one to four feet below the bottom of ties, depending upon the character of material found in the roadbed. These trenches are dug the length of the soft spot and about 5 ft. from the rail, parallel to it and extending into the track as far as the clay extended, and are filled with cinders to within 6 in. of the bottom of the ties, on top of which is placed the 6 in. of stone ballast. The cinders answer the double purpose of distributing the train load evenly and acting as a blanket to the material beneath, and, on account of its porous qualities, dries up the wet material by

capillary attraction and evaporation, draining the spot from above instead of from below.

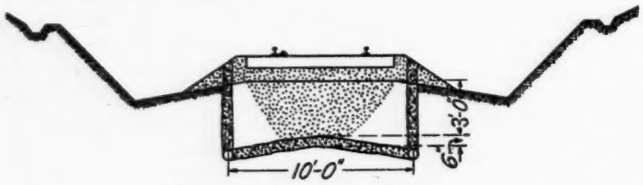
Locomotive cinders have long been used for ballast on Eastern roads, but the mistake is frequently made in filling the track with the material and doing the tamping and surfacing on the cinders, which soon causes them to lose their "life." This can be overcome by ballasting the track with stone after the cinders have been placed beneath, which allows all the work to be done on the stone and also allows the cinders to retain all the good qualities. On all of our present construction work we first put a foot of cinders and on top of this 8 in. of stone ballast, and we expect in this way to reduce the wet cut and soft spot trouble to a minimum.

DRAINING NEW CUTS AND FILLS.

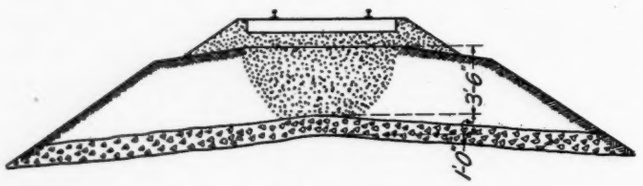
BY J. C. BACH,

Roadmaster, El Paso & Southwestern.

To keep cuts properly drained, ditches should be kept clean. There should also be intercepting ditches on the tops of cuts to keep any water from draining from watersheds into the cuts. I once had on my district a considerable portion of reconstructed track. The new roadbed was ballasted with cinders and river gravel. We had very large engines on this district and, of course,



Method of Tiling Cuts.



Cross Drains in Fills.

Cross Section of Roadbed, Showing Drains.

the cinders soon began to go down in the soft roadbed, the track got soft, and we continued to place cinders and gravel until we had 3 or 4 ft. of ballast under the track in soft places. It soon became apparent we must have sub-drainage, as the ballast was settling in the roadbed as fast as we could apply it. I used 6-in. tiling, 1 ft. long, without bells. The manner of placing the tiles was as follows:

First, test holes were dug in the center of track to find the depth of ballast. Plenty of water was found standing in the roadbed on portions of track where there had been no rains for sixty days. After digging test holes an engineer ran levels on the track and marked the depth of tile on the web of the rail every 20 ft. The ditches were dug to these levels, always with a fall of not less than 2 in. to 100 ft., and located not more than 12 in. from ends of ties and parallel with the track.

After the ditch was dug, 1 in. x 6 in. x 16 ft. boards were laid in the bottom of the ditch and leveled with a level board to conform exactly to the engineer's levels. Tile was laid on these boards very carefully and the ditches were filled with cinders to the top of the sub-grade. Only in a few instances was it necessary to put tiling except on both sides of the cuts, but in order to get water to drain to the tiling from the center of track three or four cross ditches were placed in every 30 ft. of track, and filled for a depth of at least 12 in. with clinkers or broken rock. In all cases tiling was placed 6 in. lower than any ballast in track.

This tiling was placed with extra gangs, about twenty men in each gang. The foremen received $75 per month and laborers $1.50 per day. The average cost of tiling, including putting surface ditches in cuts in proper shape and disposing of dirt taken from ditches, was 26 cents a foot.

In a number of fills where the same conditions existed similar cross drains were tried without success, as the heavy weight of the locomotives would buckle the tiling.

The most successful way to drain fills was found to be by cutting ditches every 15 ft. across the entire width of the fill and 6 in. below any ballast, filling them with coarse clinkers or broken rock for at least 2 ft. in the bottom, and filling the rest with cinders to the top of the sub-grade, always taking care that these ditches sloped from the center of track each way sufficiently for drainage.

ECONOMICAL METHODS OF DRAINAGE.

BY P. H. HAMILTON,

St. Louis & San Francisco.

The prevalent method of draining cuts is by the use of drain tile. If drain tile is considered too expensive a trench can be dug and filled in with cinders or rock. Cinder drains cost from four to ten cents per foot, according to the depth of the trench, and other conditions which are not constant. Eight and 10-in. No. 2 tile can be bought about as cheap as standard 6-in. tile, and they are much more satisfactory. They are much stronger and not so apt to crush; the larger opening will carry away more water, and they do not fill up with debris so quickly. Before covering the tile hay should be put around the joints to keep out the dirt. No. 2 tiles or culls are the tiles that are over glazed, slightly distorted, or have some other minor defects, but they are as good for draining cuts as first-class tile. Eight inch vitrified seconds cost six cents per foot. They are easier to handle, being 30 in. long, which allows them to be applied much more rapidly. For tiling a 1,000 ft. cut on both sides of the track, putting the tile about 30 in. deep, the cost is:

Labor	$75.00
2,000 ft. 8-in. No. 2 vitrified bell-end drain tile	120.00
	$195.00

No charge is made for the cinders used.

In very wet cuts cross drains of cinders or spawls should be put in under the track. Tiles can be used but they are apt to crush. A cross drain, if made of cinders or spawls, should extend clear across under the track to equalize the bearing of trains passing over it. With half width drains the side opposite the cross drain holds up, while the side over the drain has a tendency to "slough off," or give, making the track "swingy."

Old boiler flues can be used to advantage in draining embankments. A cap is put over the flue to keep out the dirt and it is driven into the embankment to the center of the track with maul or a heavy sledge hammer. A rod is run into the flue and the cap is knocked off. This makes a good pipe drain, which may be considered permanent, cheap and easily put in. The cost of these scrap flues is practically nothing. The company gets about one-half of a cent per pound for them. The cost of putting them in will run from thirty cents to a dollar each.

The most economical drains for embankments are old cross or switch ties. An old tie put into the shoulder of the fill at intervals will not make a clear opening, but seepage will pass along it if it is placed in a slanting position. After the tie is decayed it will leave a porous earth which the water will pass through.

Boxed track is often caused by failure to keep the earth levelled down with the bottom of the ballast when widening banks, forming two parallel walls at the ends of the ties. All of the water that falls on the track will run down between these walls to the lowest place on the road bed and accumulating there, is sure to make a soft place. In widening banks care should be

taken to have the crown of the fill in such shape that it will drain off at all times. If the levelling down is done by hand the foreman in charge should see that the earth is kept below the bottom of the ballast. If the work is done with a spreader the same care should be taken. Possibly this extra precaution will run the cost per yard of bank widening a little high, but it is justified in the reduction in maintenance costs. A spreader is much more economical when it will work satisfactorily. In a recent job of bank widening the earth which was being handled would soon pack so there was trouble in getting it levelled down below the bottom of the ballast. The front of the wings of the spreader would nose into the dirt and it would stick. When the spreader was backed off and run at it, the front end would cramp and the rear wheels would buck off the track. After several efforts of this kind the spreader was in bad order. Then the shoulder had to be levelled off by hand. In handling about 1,500 cu. yds. per day it cost about two cents per yard to keep it levelled down to the bottom of the ballast. While the spreader was being repaired fish plates were placed on the wings for teeth, which kept the earth loosened up, and there was no further trouble. This reduced the cost of levelling to practically nothing as the spreader was operated by the unloading crew.

PREVENTING AN EMBANKMENT FROM SLIPPING.

BY W. T. MAIN,
Division Engineer, Chicago & North Western.

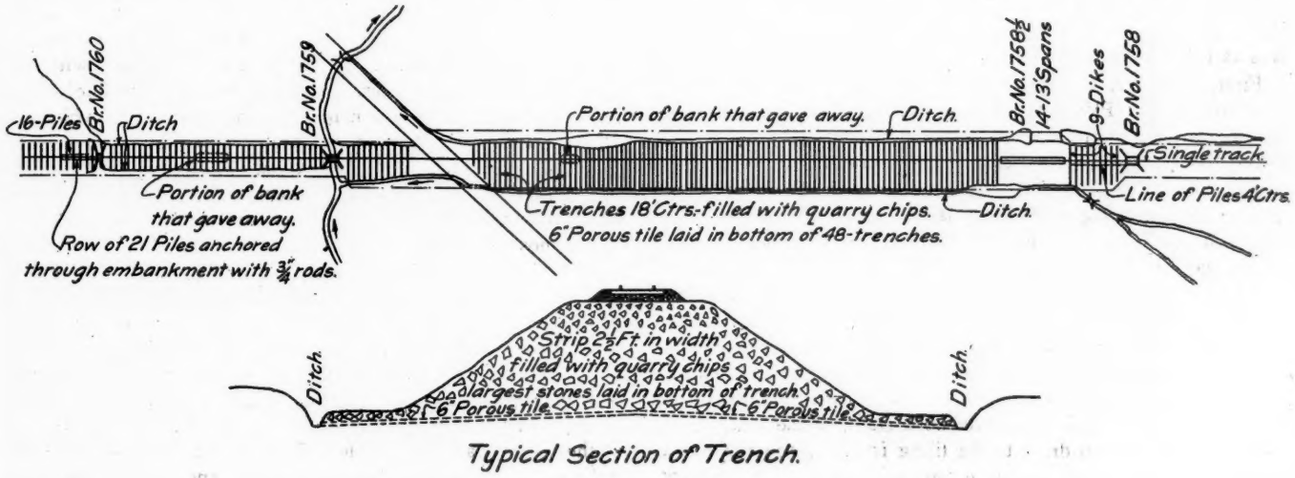
"Eden Slide" is four miles north of Eden, Wis., on the single track line of the C. & N. W. The portion of embankment which has given trouble is 3,500 ft. long, including the north third of the whole fill, which is on a tangent having 0.80 per cent. descending grade to bridge No. 1758; 0.74 per cent. descending grade from bridge No. 1758 to bridge No. 1759 and 0.6 per cent. rising grade for the remaining 1,200 ft. of the fill. The height of embankment above original ground level is 18 ft. at bridge No. 1758; 14 ft. at bridge No. 1759 and 10 ft. at bridge No. 1760. The earliest records show slippage of the embankment and settlement of the west track rail 200 ft., and cracking of the embankment 400 ft. north of bridge No. 1758. In November, 1902, such slippage of the west shoulder as had occurred had been filled with cinders, sections showing maximum depth of cinder filling 4 ft. under ties at the west end, and 5 ft. below the subgrade at the shoulder, 10 ft. from the center of track. Sections indicate the length of slip to be about 150 ft. along the west shoulder and extending to the east end of the ties at one point. At this time it was proposed to drive 20-ft. cedar piles on three-foot centers along the west shoulder for 250 ft., but as the embankment froze and gave no further trouble work was postponed.

No record of further slippage appears until August, 1903, when a heavy rain almost in the nature of a cloud-burst caused the utter failure of the embankment for 140 ft. at a point 300 ft. north of bridge No. 1758. This wrecked a passenger train. A pile bridge 143 ft. long, No. 1758½, was immediately driven to carry traffic, and an examination of the embankment was made by cross cutting, the report being in part as follows:

"This excavation shows that bank was originally constructed of about 4 ft. of light porous black soil borrowed adjacent to right-of-way. On top of this was placed 7 or 8 ft. of heavy red clay taken from cut to the north. Afterward apparently grade was raised and bank widened with light yellow clay. This combination of material left a very unstable bank, which finally resulted in slipping as shown.

"The road at this point is located in a slight sag which was evidently the drainage to the ditch north for the land east and west. The water now comes from east and west to our banks, and owing to the drainage box under highway on west being too small and no opening on the east, keeps the borrow pits full of water. This standing water by capillary action saturated the porous black soil to such an extent that the red clay slid out to the right-of-way fence. The sliding action was aggravated by filling in with cinders which left pockets for the retention of water. I would recommend that natural conditions be restored as nearly as possible by constructing drainage ditches along the east and west sides, putting an opening along highway on east and enlarging present opening on the west and fill all borrow pits. The bank under the temporary pile bridge should be leveled off and the red clay cut down and spread out so that material above would rest upon it instead of enveloping it at present. We are likely to have trouble at other points on this bank, as it is all of the same construction."—(*W. H. Finley's report, November 5, 1903.*)

The above recommendations as to drainage were carried out in the summer of 1904, additional right of way being secured for ditches. Also, three additional spans were added at the south end of bridge No. 1758½, and piles driven on 4-ft. centers along the west shoulder of the embankment from bridge No. 1758 to No. 1758½, on account of the embankment showing some settlement and cracking in wet weather. In the fall of 1904 it was apparently decided that any ordinary system of drainage was insufficient to drain the embankment, and during the winter of 1904-5 62 cross trenches, 2 to 2½ ft. wide and on 18-ft. centers, were dug north from bridge No. 1758. Trenches were carried from the ditch on the east through the embankment to the ditch on the west, with about 2-ft. elevation of the bottom of the trench under the track above the side ditch. Trenches were filled with quarry chips, and 48 had 6-in. porous tile laid in the bottom. The trenches average 100 ft. long across the tracks, and are 12 to 16 ft. in depth. Those laid with tile cost $79.86 each, and those without tile, $77.16. No further trouble has been experienced in this part of the embankment. In April, 1908, there was a slippage of the west shoulder some 60 ft. long just north of bridge No. 1760, also some settlement of track midway between bridges No. 1759 and No. 1760. Immediate action was taken by driving piles on each shoulder and anchoring them with rods across the track. It was then decided to continue the construction of the cross trenches, and 106 were built during the summer



Remedying Trouble From Sliding Roadbed; Chicago & North Western.

of 1908 to connect with the work of 1905. These were laid without porous tile in the bottom, quarry chips and small rubble only being used for filling trenches, which cost $65 each. Pile bridge No. 1758½ was filled with sand and gravel in 1908 and the stringers removed.

This red clay will absorb water until it will run like mortar. The clay seems to have sufficient fine sand in its composition to become thoroughly saturated. The cupping action of track and ballast on the embankment would hold water from running off the slopes and allow it to soak into the embankment, and whenever rain was of sufficient duration the embankment became soaked and slips occurred either in spring, summer or fall. Cross ditches provide escape for excess of water and also bolster up the fill. There has been no trouble since the completion in 1908.

DRAINING AN EMBANKMENT WITH DRIFTS.

BY G. LE BOUTILLIER,
Division Engineer, Pennsylvania Lines West.

At a number of points on this line there are deep fills or embankments which have continually slipped, due to bad subdrainage conditions, causing considerable expense to keep the tracks to line and surface. One of these embankments was treated by applying a special drainage system, and since that time no movement in it has taken place; the work has been extended with similar results.

The embankment referred to is situated where the gradient is 0.97 per cent., descending westward and the alinement a 6 deg. 45 min. curve to the right. It is of variable depth, the maximum being about 50 ft., and carries two high speed main tracks. As long as any record has been kept, it was impossible to keep the west track to good line and surface, on account of settlement in the roadbed, and some difficulty was experienced with the east track. This settlement of the roadbed was going on at all times, but was particularly troublesome during wet or thawing weather. It was necessary to line and surface the west track for a distance of 500 ft. every few days, and on one occasion the embankment suddenly settled about a foot for some distance.

Careful investigation showed that the embankment was built on a bed of shale and nearly all water entering it was retained above the shale, so that the embankment was saturated to a greater or less extent at all times. A 36-in. cast iron pipe culvert located near the middle of the slip and extending through the embankment was found to be broken off under the west track, inside the embankment. The down stream portion, under the west track, had settled with the slip about 18 in., allowing large quantities of water to flow directly into the embankment.

Three fresh drains were constructed by driving drifts into the embankment. These drifts were 3½ ft. high, 4 ft. wide at the bottom and 3½ ft. wide at the top, lined with 3-in. oak plank. When the drifts were completed, flat stones were placed in the bottom of each to form a box drain about 5 in., square, and the remainder of the drift was back filled with No. 2 rubble.

The drifts were all started about 35 ft. below the top of rail, in the embankment along the west track, and were driven on an ascending grade of 10 per cent. Each drift is about 20 ft. below the top of rail.

Two drifts were started at points about 80 ft. apart at spots where water was detected flowing from the embankment in small quantities. Each of these drifts followed the subterranean water course and gradually approached each other. The first one was driven 95 ft. to a point about 20 ft. from the center of the west track. The second was driven 115 ft. to a point about midway between the two tracks. Considerable water was encountered in driving these drifts, and when the second one had been driven to a point directly under the west track a 6-in. stream of water was tapped in a pocket of yellow clay, which flowed steadily for a period of twenty hours. There appeared to be very little moisture above these two drifts.

The third drift was started at a point about 150 ft. east of the second one, which appeared to be below the portion of the embankment saturated with water, due to the uneven bed of shale. Water dripped in considerable quantities through the roof of this drift throughout its entire length.

The third drift was driven 145 ft., extending entirely through the embankment. Shale rock was encountered under the east track, so the rest of the drift was cut part way into the shale.

In all of the drifts limestone ballast was found in large quantities, which gives a good idea of the amount of settlement that had taken place in the embankment since it was constructed, about sixty years ago.

While the drifts were being driven, repairs were made to the cast iron pipe culvert. The tracks were supported on pile bents and the portion of the culvert which had settled was taken up. Test piles were driven in the water course, and it was found that the shale bed descended to such an extent that a satisfactory foundation for the culvert could only be obtained by driving a pile foundation for the pipe to rest on; therefore three rows of pipes were driven on 3½-ft. centers, each row containing nine 35-ft. piles. The rows of piles were placed 5 ft. apart. On this pile structure was constructed a 36-ft. reinforced concrete culvert, 48 ft. long, connecting with the portion of the cast iron pipe which had not been disturbed by the slipping of the embankment.

A grouted cobble stone gutter was also constructed for a distance of about 150 ft. from the up stream end of the culvert, to insure the conduct of all water from the ravine into the culvert. From the down stream end of the culvert a similar gutter about 100 ft. long was constructed to join the original ground surface, to prevent the collection of debris which might back water into the culvert and along the foot of the embankment.

The entire cost of the work described was as follows:

Three drifts complete	$1,857
Repairs to culvert and constructing gutter	1,663
Total	$3,520

About $600 was annually expended on this embankment in addition to ordinary maintenance expenditures.

ENGINEERING ARTICLES SINCE AUGUST 18.

The following articles of special interest to engineers and maintenance of way men, and to which readers of the maintenance of way section may wish to refer, have appeared in the issues of the *Railway Age Gazette* since August 18:

Three letters on College Men in Railway Work, referring to former letters which have appeared from time to time in recent issues, appear on page 365 of the issue of August 25, and on pages 396 and 397 of the issue of September 1.

Peking-Kalgan Railway.—The building of this Chinese railway was the most difficult piece of construction ever handled in that country and it is particularly noteworthy on account of the fact that the entire work was handled by native officers employing native labor. The costs were less than many of the foreign built roads under much more favorable conditions and the building of the road sets a precedent for future construction in the Chinese Empire. The engineering details of this work are given in an illustrated article, page 366 of the issue of August 25.

Burlington Suction Dredge.—The results secured by the use of a suction dredge for filling along the banks of the Mississippi river for the second track on the Chicago, Burlington & Quincy are given in an article, which includes drawings, photographs and detailed information, in the issue of August 25, page 375.

Worcester Union Station.—The new union station at Worcester, Mass., which is part of the complete plan of improvements by the roads entering that city, is described and illustrated in the issue of September 1, page 399.

Station and Terminal Yards of Canadian Northern and Grand Trunk Pacific at Winnipeg.—The new Fort Garry terminal in Winnipeg is described in the issue of September 8, page 462, by J. Schofield, assistant architect of the Canadian Northern, who furnishes an interesting description of the building, yards and terminal layout.

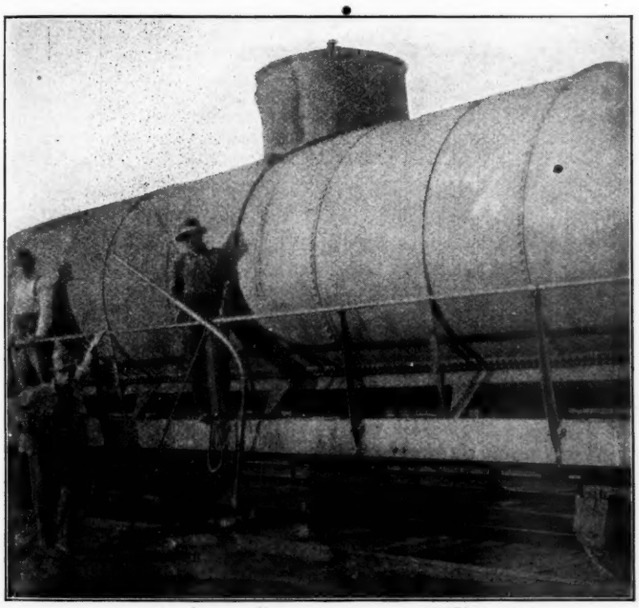
Concrete Piles for Bridge Foundations.—The use of concrete piles in railway work is of comparatively recent date and data concerning the driving of such piles is scarce. The experience gained on the Kentucky & Indiana bridge over the Ohio river at Louisville is given in an illustrated article on page 480 of the issue of September 8.

BRIDGE AND BUILDING CONVENTION.

The twenty-first annual meeting of the American Railway Bridge and Building Association will be held in St. Louis, Mo., October 17, 18 and 19. The committee reports will include the following subjects: Best Method of Numbering Bridges; Buildings and Platforms for Small Towns; Sash, Size and Kind of Glass that is Economical for Roundhouses and Shop Buildings; Plans of Fireproof Oil Houses; Best Method of Fireproofing Frame and Trestle Bridges; Derricks or Other Appliances for Handling Heavy Material in Supply Yards; Pumping Engines, Best Kind and One Most Economical to Use—Gasolene, Oil or Electric; Records of Bridges, Buildings and Other Structures, Showing Cost of Construction and Maintenance; Concrete Tank Construction and Recent Developments and Suggestions: Feasibility of Using Brick Veneer for Station Buildings; Roofs and Roof Coverings.

OILING TRACKS IN CHICAGO.

The Chicago, Burlington & Quincy has been oiling its tracks in the suburban district between Chicago and Downers Grove, 21 miles, to keep down the dust. A simple sprinkling arrangement was devised by the mechanical department. It consists of a 4-in. pipe perforated on the bottom and connected at the center to the outlet pipe of an ordinary tank car. Two elbows are placed in this pipe a short distance outside the rail, forming a joint to allow the outer section of the pipe to be raised when passing obstructions, such as station platforms and cattle guards. As the pipe is perforated over the rail, small shields are placed at these points to divert the oil from the rail. The flow of oil is regulated by the long lever extending up along the side of the car and connected to the outlet valve. The oil is heated with steam from the engine, so that it will flow readily. The entire apparatus can be disconnected from one car and attached to another in 10 or 15 minutes.



Oil Sprinkler in Service.

About 1,800 gal. of crude oil is used per mile and the track is sprinkled at the rate of about 3 miles per hour. The ballast is a rather coarse gravel. The cost of the first 39 miles of track oiled was $50 per mile, of which about $45 was for oil. Three men in addition to the train crew are required to operate the sprinkler.

The Illinois Central is using the same arrangement in oiling their six passenger tracks between Grand Crossing and Chicago, a distance of about 8 miles. About 2,200 gal. per mile is used on these tracks, as the ballast is largely cinder. The accompanying view shows the apparatus in use on these tracks.

SINK HOLES ON THE CANADIAN NORTHERN EXTENSION INTO DULUTH.

The Canadian Northern has encountered a number of bad sink holes on the extension now being built between Duluth and Virginia. Many of these were filled directly with small dump cars, but in two instances the surface did not break through until after the track was laid over them and construction trains were running. At the larger one, located at milepost 56, soundings taken for a distance of about 1,500 ft., showed a depth of from 20 to 45 ft. of soft mud. The surface crust appeared to be fairly solid and it was hoped that it would hold up, but it broke through early last spring after trains had been running over it but a short time. About the middle of April this hole became so bad that it was impossible to operate trains over it and steps were taken to completely fill it.

To support the track, timbers were laid about 30 ft. out on each side of the center line and parallel with it. Large white and Norway pine and tamarack logs were laid across these outside timbers at intervals of 3 ft. The track was then laid over this grillage and the cars were dumped between the cross timbers. In the first 100 ft. of the hole an average of 200 12-yd. cars were dumped each day for three weeks before the material appeared above the surface of the water, for after the crust of the swamp was broken there was nothing immediately below the track but water and liquid mud. About a week after soundings were begun new soundings were taken, and where they had formerly showed a depth of soft material of 35 ft. they now showed a depth of 60 ft., indicating that there were harder layers of material in the soft mud. This was borne out by the action of the embankment which would be brought up nearly to grade, and would then drop suddenly a distance of 15 or 20 ft.

After spending over six weeks of steady work at this hole, and after filling only about 500 ft. of it, it was decided to try to prevent the rest of the swamp from breaking through. Contractors were ordered to crossway it with heavy timbers for a width of 50 ft. and a depth of at least 2 ft. where it had not already broken through, which work is now under way. In constructing this grillage, timbers are first laid close together longitudinally and with broken joints for the 50-ft. width. On top of this cross timbers 50 ft. long are laid close together. A layer of brush is put on top of this and the embankment dumped on the brush. In addition to this crosswaying a dredge is now digging a ditch 12 ft. deep for a distance of two miles to drain the swamp and solidify its surface. It is expected that these measures will remedy the trouble at this point.

At milepost 69 two sink holes were encountered close together with a small ridge between them. Each hole was about 600 ft. long, and one had a maximum depth of 35 ft., while the other showed no bottom at a depth of 50 ft. Both of these have been filled solidly, using the same method as at milepost 56. They required about six weeks' work, dumping an average of 180 12-yd. cars per days.

This line is being built under the direction of H. T. Hazen, chief engineer, to whom we are indebted for the foregoing information.

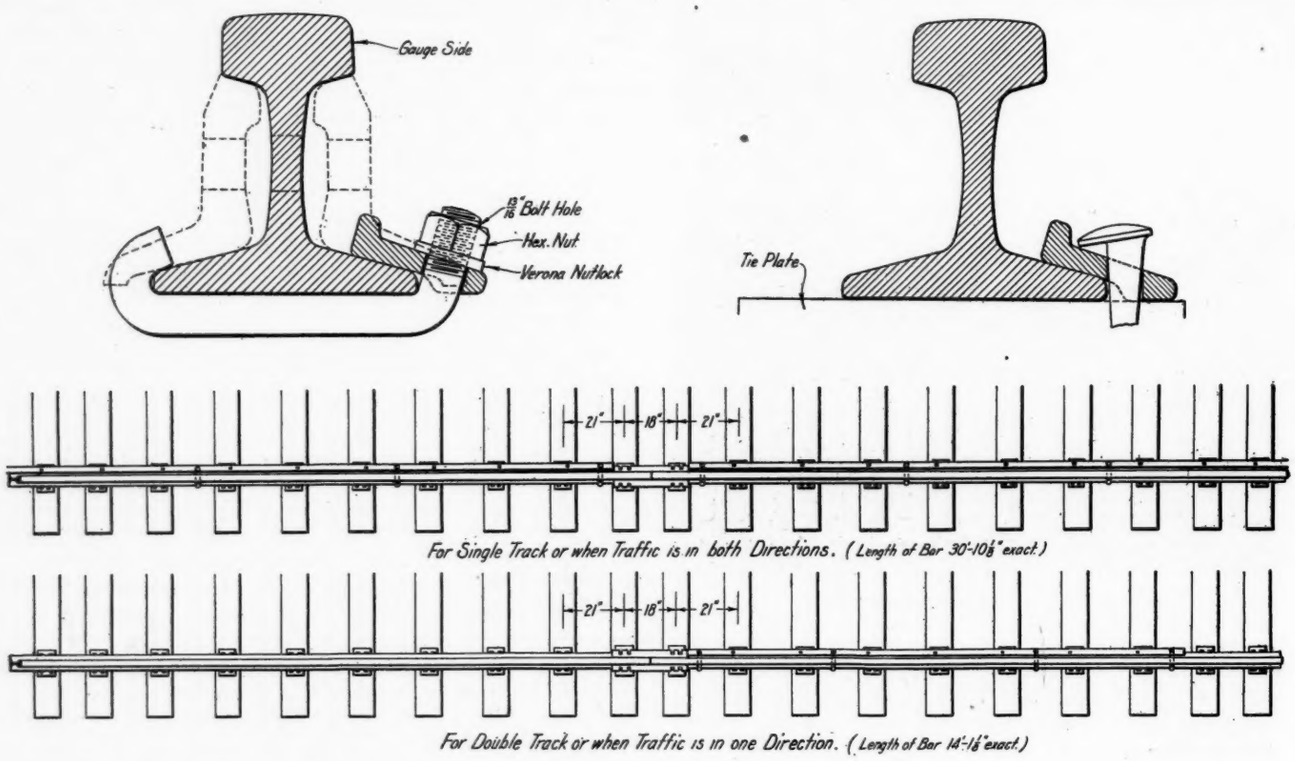
Gravel or stone ballast which lodges in the cars during unloading can frequently be loosened by laying the end of a lining bar or a track chisel on the rail in front of the car wheels, and allowing them to pass over it. This will jar the material loose much quicker than having the men pound on the sides of the car or pockets. In some cases small chisels or pieces of steel bars are carried by the unloading gang for this purpose.

THE SULLIVAN ANTI-CREEPER.

On the lines of the Canadian Pacific east of Winnipeg conditions are very favorable for excessive creeping of rails. The tracks cross many muskegs, some of which are four to five miles long, and in extreme cases the rails move as much as 8 in. during the passage of a single train. Since the second track has been constructed between Winnipeg and Fort William, this trouble has been greatly increased, owing to the traffic on each track all moving in one direction. For a number of years experiments have been made with various anti-creepers in an endeavor to arrest this movement. It was found that it could be stopped if enough rail anchors of the ordinary types were used, but the cost was very high.

After considerable study and experimental work, J. G. Sullivan, assistant chief engineer, designed the anti-creeper shown in the accompanying drawings. It consists of a bar fitting over the base of the rail on the gage side and butting against the angle bar at the joint. Hook bolts pass through this bar and under the rail near each end, and at intervals along the bar to maintain contact with the rail in order to prevent its slipping past the angle bar, and to avoid rattling. This bar is slotted and spiked to each tie. On single track lines, where the traffic moves both ways, the bar extends from one angle bar to the next, butting against the joint at either end, but on double track it is only necessary that it be in contact with the angle bar at one end. For single track the total length of the bar is made the exact distance between angle bars for the rail used and the bars are slotted for the spikes to correspond with the standard tie spacing.

This bar was first placed in the track in the spring of 1908, and the results have been entirely satisfactory. It was found that it was necessary to place the bars only on every second rail in the worst places and at longer intervals where the creeping was less severe. Its use is being gradually extended to all parts of the system. This device would not be economical where but an ordinary movement of the rails exists, because of its cost, which varies from $300 to $1,000 per mile in place, according to the number of bars placed, but under severe conditions it is more economical than the common rail anchors, of which it would be necessary to put on large numbers to accomplish the same results. This device was patented by Mr. Sullivan some time ago, and he has since disposed of his interests to the Q. & C. Company, Chicago.



Sullivan Anti-Creeper for 33-ft., 85-lb. Rail.

CONSTRUCTION COSTS ON PANAMA CANAL.

A recent statement of construction expenses on the Panama canal work shows the following detailed cost of manufacturing concrete piles:

Items.	Atlantic Division.			
	April.	May.	June.	Total.
Quantities—lineal feet	10,002	5,904	5,760	21,666
Cement	$0.1024	$0.0828	$0.0760	$0.0900
Stone	.0750	.1176	.1145	.0971
Sand	.0178	.0255	.0080	.0173
Mixing	.0358	.1157	.0512	.0617
Placing	.0334	.0711	.0323	.0434
Reinforcements	.8584	.7276	.6346	.7734
Forms	.0922	.0344	.0786	.0729
Maintenance of equipment.	.0053	.0054	.0114	.0069
Plant arbitrary	.1794	.1700	.1700	.1743
Division expense	.0114	.0170	.0210	.0155
Total cost	$1.4111	$1.3671	$1.1976	$1.3525

The cost of driving these piles varied so widely owing to climatic and other local conditions, that the figures are of little value. For instance, during April the piles, which cost $1.41 to make, only required an additional expenditure of 26 cents for driving, while the piles during June, which had cost $1.19 to make, required an expenditure of $9.35 for driving. This latter figure, however, is apparently the exception, for the costs of driving in the other three months are, respectively, 26 cents, 62 cents and 77 cents.

Arrangements have been made to sow various kinds of grass seeds on the slopes of the Culebra cut at the Panama canal with a view to reducing the erosion. The seed is now on hand and will be planted under the direction of a botanist from the Smithsonian Institution.

ROADMASTERS AND MAINTENANCE OF WAY CONVENTION.

The twenty-ninth annual convention of the Roadmasters and Maintenance of Way Association was held in the parlors of the Southern Hotel, St. Louis, Mo., September 12, 13, 14 and 15. The opening session on Tuesday was called to order at 11:30 a. m. by T. Thompson (A. T. & S. F.), president of the association. The registration was about 75 members and 40 guests. The secretary reported 85 new members.

President Thompson, in his opening address, said: "We are here to educate ourselves by exchanging ideas on the best methods of track maintenance. Every member should take an active part in discussing all questions. Improved standards in track construction make it necessary that every roadmaster keep in touch with the latest track appliances and material. I would advise every member to watch the standards adopted and conform thereto as strictly as possible. The benefit of the convention is as great for railway companies as for the individual members."

The secretary read letters from several general managers expressing the desire that their roadmasters attend the convention. Memorials of deceased members were then read. It was voted to form a ladies' auxiliary.

MANGANESE FROGS AND CROSSINGS.

The members of the committee reported close examination of a number of frogs and crossings in use on various roads, the general conclusion from such investigation being that manganese frogs and crossings have proved a success. It was found that the use of this material has greatly reduced maintenance expense by eliminating the cost of bolts which are ordinarily used in Bessemer frogs and crossings, and by saving timbers which are ruined by respiking and rail cutting when used with ordinary frogs and crossings. One member of the committee cited a case in which he had installed two No. 10, 85-lb. manganese frogs in December, 1908. These frogs were in a track carrying the heaviest kind of traffic on a switching lead. One of the frogs is still in the track and will wear one more year. The other frog was removed February 1,1911, on account of flange wear on the toe and heel of the adjoining Bessemer rail. The manganese part of the frog is still in good condition, and would wear out another set of rails. The longest service obtained from the ordinary Bessemer rail frog at this point was 30 days. On this basis the manganese frog has given service equal to 26 Bessemer frogs, the relative cost being about $29 apiece for Bessemer and about $94 for manganese. There has been no expense for maintaining the manganese frogs up to date, while the rebolting of Bessemer frogs was always a heavy item. The committee recommends the extensive use of solid, boltless manganese frogs and crossings for heavy switching leads, and at other points where traffic is heavy, particularly for crossings used for high speed main line movements.

Committee:—M. Burke (C. M. & St. P.), chairman; James J. Duffy (C. & I. W.), T. Thompson (A. T. & S. F.).

Discussion:—A. M. Clough (N. Y. Cent.)—I lack confidence in manganese frogs for main line high speed track. Many roads use hard steel frogs with centers constructed exactly like manganese frogs. Evidently they consider it safe to bolt single-faced rails to such frogs and use them under fast traffic.

A. Grills (Grand Trunk)—We have had a manganese crossing frog in service for four years, which shows slight cracks in the flangeway. The wear on the rail is imperceptible, so that cracks cannot be due to the flanges bearing on the flangeway.

A. B. Richards (L. E. & W.)—On a crossing having heavy high speed traffic in one direction and low speed traffic in the other direction cracks which developed in the flangeways of the frogs under low speed traffic have not opened up since they were first noticed.

Mr. Grills—Manganese points in crossings are usually cut off too short and the frogs are badly worn by impact, followed by rapid wear on the adjacent Bessemer rail.

W. R. Thompson (Cent. of Ga.)—We have experimented on frogs in yards and found that manganese gave a service of 6 to 1 as compared with Bessemer. I would recommend manganese for use in yards, but I doubt the advisability of using it in high speed tracks where a severe blow comes on the frog as the wheel leaves the worn soft rail abutting the hard frog.

The convention accepted the statement of the committee that manganese frogs and crossings have proved a success.

T. Thompson (A. T. & S. F.)—We estimate the saving in maintenance by using manganese frogs to be 70 per cent.

W. R. Thompson—My experience shows 75 per cent.

L. C. Ryan (C. & N. W.)—The North Western has solid manganese frogs throughout the new Chicago terminal. Some of the curves are very sharp and there is a speed as high as 50 miles an hour over some of the frogs. The reports show almost perfect service.

T. Thompson—The Santa Fe had adopted as standard for No. 14 turnout solid manganese frogs with lap-jointed rails.

At the request of the convention, F. B. Bradley (Ajax Forge Company) explained that there are four kinds of manganese frogs. First, a solid one including wing and point rails; second and third, solid frogs, one having Bessemer track rails butt-jointed and the other lapped; fourth, a rail-bound manganese frog having a rail bolted to the manganese. There is difficulty in making the first type because of the difference in temperature throughout the frog during casting, causing a tendency to crack. In this type the length of the point and wing rails is changed from the type used in the Bessemer frog, since no company can afford to pay for manganese frogs made to the standard now used.

T. H. Donahoe (B. & O.)—We have had seven years' experience with manganese and frequent tests show that it gives three times as much service as Bessemer. One test shows ten times as much service with only 1/10 as much maintenance. Boltless frogs are all right for yard use but for high speed track they are too short. We have had very few bolt failures. For crossings on acute angles solid manganese frogs should be used. On obtuse angles manganese frogs reinforced with Bessemer rails are better. Manganese switch points give ten times the service of Bessemer. Manganese points are usually more blunt than Bessemer points, causing engines to climb, but this is remedied in recent devices.

That part of the report of the committee referring to solid boltless frogs was changed so as to recommend solid center manganese frogs and crossings.

SOFT TIES.

The committee reported on the subject, "Is It Economy to Use Soft Ties for Switches, Switching Leads and Tracks?" It was decided to consider cedar, pine, gum and similar woods as soft wood; and oaks, beech, hickory, hard maple, ash, pecan and honey locust as hard wood. As the most common representatives of these two classes, cedar from the soft woods and white oak from the hard woods were particularly considered. The necessity for safety in track construction must be considered as of equal importance with economy, and in commenting on that subject the report brings out the following points: Safe track depends on line, surface and gage; which are produced, respectively, by rail, ballast and ties, each, of course, being in a manner influenced by the others. The weakening of any one of these three elements in the track produces an unsafe condition which must be guarded against. The safety of the main track is also affected by adjacent tracks, and for that reason ladder tracks and passing tracks must be designed to prevent derailments or other accidents which might block the main track. The freight business on the average road has developed far more rapidly than the track facilities in the terminal yards, and it must be remembered in designing tracks for such yards that

an accident may block the entire yard, and cause considerable delay to important freight traffic.

For branch lines cheap soft wood ties are often laid when the road is built, with the intention of replacing them with hard wood ties when business has sufficiently developed to warrant the expenditure. It is pointed ont in the report that such economy is proper if the managers can be sure that the increased business will not come before the end of the life of the soft wood tie. An instance is cited of a track 34 miles long, built with 65-lb. rail on cedar ties and gravel ballast, which handled the line's traffic satisfactorily for 13 years, when, simultaneously, a stone field was developed near the line, coal was diverted from another line, and merchandise was sent over that line to take advantage of its low grade. The light track construction was entirely inadequate to support the heavy equipment which had to be used to handle the increased business, and the first step taken was to replace 1,500 cedar ties per mile with oak during one year. The remainder were changed as fast as possible. The gravel ballast and the light rail after five years of this service are still in good condition. The cedar ties when removed were apparently sound on top, but were slightly decayed from the bottom; were crushed from 1 in. to half their depth by the rail; and were seriously damaged by respiking to restore the gage. When this line was built the cedar ties were selected on account of their long life, and the fact that there was no apparent demand for a hard wood tie within 25 years. The committee is of the opinion that conditions in repair yards are ideal for soft ties. Here the heaviest load is a switch engine and the speed is always low. Similar conditions exist in empty tracks at coal mines and in storage tracks where traffic is light. The long life of the tie and its lower first cost can properly be taken advantage of in such places.

Committee:—Jas. Sweeney (C. & E. I.), J. W. McManama (B. & M.), W. H. Heath (Cent. of Ga.), Oscar Gabriel (A. T. & S. F.), John McNulty (C. R. I. & P.), Chas. Newberg (C. & N. W.).

Discussion:—T. H. Hickey (Mich. Cent.)—The Michigan Central has used cedar ties for many years, but has now quit buying them. They are not satisfactory under heavy traffic, and even on branch lines where standard equipment is used these ties are being replaced by white oak.

G. M. Greene (C. R. I. & P.)—If the question is limited to cedar and oak ties, I would say that the cedar tie is unfit for use in any kind of track.

T. Thompson—I do not believe we should condemn cedar ties. The number in use on branch lines and side tracks is very great and they are giving good service.

C. E. Boone (Bangor & Aroostook)—It is economy in our part of the country to use cedar ties, because that is the only kind we can get.

A motion was carried to the effect that cedar ties are not suitable for switch leads or main track under heavy traffic, but may be economical for straight track under light traffic. The committee report was revised so as to recommend that no wood softer than yellow pine be used for switch ties for main track, but that softer woods than yellow pine may be economical for light traffic. The report was then accepted.

HOW TO REMEDY SOFT SPOTS IN THE ROADBED.

The usual cause of soft spots in fills is the presence of clay from the bottom of borrow pits or stumps placed in the dump by contractors; and in cuts the presence of decomposing timber and gumbo clay. Such spots soon fail to support the track; additional ballast is tamped into them; and a typical soft spot is soon formed. When the cause is a stump or timber the objectionable material should be removed at once, as the trouble may be expected to continue until it has rotted entirely away. Clay on the surface of a fill usually holds water in pockets which must be drained by transverse trenches. These trenches should be a foot or 18 in. below the bottom of the pocket, and as close together as the formation of the subgrade requires. They should be 18 in. wide and filled with coarse engine cinders to a depth of 15 in., with ordinary cinders above that to the level of subgrade. The cost of such work in dollars per trench is given as follows:

Depth of Ditch.	Material.		Labor.		
Ft.	Tile.	Cinders.	Max.	Min.	Ave.
3	.04	.04	.18	.10	.14
4	.04	.05	.37	.15	.20
5	.04	.06	.56	.21	.26
6	.04	.07	.75	.27	.33
7	.04	.09	1.00	.35	.42

Soft spots in cuts, due to the presence of gumbo, are also formed by pockets of water which are the result of insufficient drainage. Many methods have been tried for remedying such conditions in cuts, and the one to be employed is very frequently determined by the amount of money available. The least expensive remedy is surface drainage. A surface ditch can be built to intercept water running toward the cut from adjoining fields, and an open ditch on each side of the track will carry away the water flling in the cuts. Such open ditches should be kept clean and free from obstructions, so that no water will stand in them. If bottom of the pocket in the subgrade is below the ditch, so that the surface drainage fails, the ballast may be removed together with the clay shoulder, which usually heaves on both sides of the track, and a new subgrade formed of good top soil from the adjoining right-of-way. In many cases this will fill up the pocket and prevent further trouble. The best results will, of course, be secured from a complete system of tile drains. In one method of tile and cross draining which has given satisfaction, an 18-in. trench is dug parallel with the track, beginning at the outlet, the center line of the tile being 9 in. outside of the end of the ties and not less than 18 in. below the pockets to be drained. A fall of at least 1 ft. in 1,000 ft. should be provided. Four-inch or 6-in porous tile without bell joints are laid in this trench after shaping the bottom of the trench with a round tool. The trench is back filled with engine cinders, and cross trenches are dug as conditions require.

The cost of such drains per foot is given as follows:

Depth of Drain, Ft.	Yards of Material.	Cinders.	Labor (Average).
3	2.5	.55	1.10
4	3.4	.76	1.49
5	4.4	.98	1.93
6	5.4	1.21	2.50
7	6.6	1.47	3.20

In another system of drainage the grade line should be determined by an engineer, and bell-end, vitrified tile, not less than 6 in. in diameter, laid on a bed of well tamped engine cinders 3 in. deep. The depth of the tile drain is governed entirely by local conditions, being always below frost line. The trench is filled with cinders, and cross drains are put in alternately from the center of the track to the drains on each side. Vitrified tile or short lengths of cast iron pipe can be used for cross draining, connection with the longitudinal drains being made with tees. In a cut which is expected to be double-tracked later, a single line of pipe may be laid on one side, with cross drains at intervals leading to concrete catch basins on the other side of the track. When the second track is laid the ditch can be partly filled with cinders and an additional line of pipe laid outside the new track.

Committee:—M. Henry (C. & E. I.), Chairman; W. B. Strother (T. & W. R. R.), Henry Klein (C. & A.), P. H. Gaffney (Mo. Pac.), J. A. Roland (C. & N. W.), A. B. Richards (L. E. & W.).

Discussion: M. F. Muff (A. T. & S. F.)—In a bad clay fill we have tried tile under the ballast. It was unsuccessful, as the heavy traffic broke the tile and displaced it. We drained it by digging cross trenches filled with slag and cinders.

Mr. Hickey.—The principal trouble on fills is lack of sufficient ballast. In some cases we have remedied bad spots by digging out the surface clay and filling it with riprap.

W. A. Brandt (C. & N. W.)—In draining cuts we back-fill the trench over the tile with cinders level with the surface. I see no

advantage in partly filling the trench with cinders and covering the cinders with earth.

Mr. Richards—We use hard glazed tile in preference to porous tile. It gives equal satisfaction and is much more durable.

J. P. Warren (St. L. S. W.)—There are three reasons for slides on fills. First, borrow pits left too close to the fill; second, hard packed runways made by scrapers and filled with loose material; third, soil laid over limestone, resulting in slides when the soil gets wet. We have found it necessary to blast the surface of the rock, scarify the surface of old runways and drain or fill borrow pits.

Mr. Clough—I would recommend non-porous bell tile. The water enters at the joints and, since the tile is usually forced out of line by traffic, bell tile is necessary to provide drainage if the line is so distorted. When the surface material on a soft spot is removed the space should not be filled with soil; stone, slag or other hard material should be used.

Bruce James (C. & E. I.)—Bell tile will fill with dirt as easily as porous tile, and porous tile draws water better than vitrified pipe.

Mr. Grills—We find that old fence boards laid along side of the line of tile largely prevents its getting out of line.

The report was accepted, after amendment to the effect that when surface material is removed the space should be filled with hard material rather than with soil; also with vitrified or glazed tile be recommended instead of porous tile. A recommendation was added that more attention be given in the construction of new roadbed to the prevention of drainage troubles.

MOTOR HAND CARS FOR SECTION USE.

The committee's report was based on the experience of its members. The chairman emphasized the fact that simplicity of construction is one of the first requisites of a satisfactory motor hand car, since section foremen are not skilled mechanics and it is desirable that the foreman be able to make any necessary adjustments during the operation of the car. Sufficient power must also be secured in such a car, as it is often necessary to carry a large force of men under adverse conditions of grade and wind. He stated that his road had installed a Fairbanks-Morse motor car which had enabled them to reduce the maintenance force practically one-half, giving one foreman a 12-mile section which had been covered previously by two foremen, each with six-mile sections. The one gang is now able to do the work easier and better than it was done before by two gangs with ordinary hand cars. Not including the wages of the laborers, the savings in the wages of one section foreman at $65 a month has amounted to $1,365 since the car was put in service. The car is equipped with handles in addition to the motor, so that in case of motor failure it can be hand-operated. This feature is considered very desirable in such a car. A member of the committee pointed out the fact that the old fashioned walking beam hand car is the most out of date piece of apparatus in use on railways today. He mentioned the use of a sail car which was a brilliant success as long as the wind blew from the right direction.

Committee:—D. E. Lynch (C. B. & Q.), Chairman; John Heshion (Mo. Pac.), A. L. Klein (A. T. & S. F.), Warren Peachey (E. & T. H.).

Discussion: C. King (Long Island)—The committee received letters from various individuals showing that motor cars are economical for branch lines and lines with light traffic. The information included was similar to that given in the *Railway Age Gazette* of May 19, 1911.

J. P. Warren (St. L. S. W.)—Motor cars should be recommended and used wherever practicable, but sections should not be lengthened nor forces reduced. The cars should be used to increase the efficiency of men on the sections they now cover.

Mr. Richards—The tendency is to increase section lengths far beyond the amount warranted by the saving in time and labor of men going to and from work.

Mr. King—It should be easy to combine three seven-mile sections in two and maintain the tracks to better standards, keeping all the labor but saving one foreman.

Mr. Ryan—We have tried maintaining twelve miles of double track with one gang and a motor car, but it was found impossible and it is now divided into three sections.

Mr. King—I do not favor lengthening sections, but it is difficult to secure motor cars unless the company could be given the advantage of some of the savings effected by their use.

A motion was made and carried, to the effect that the association approves the use of motor hand cars for section use.

CONCRETE AND STEEL TIES.

The concrete and steel ties which are being experimented with on many roads have developed a number of defects. Many of them are heavy and hard to handle, increasing both first and maintenance cost. Some of the steel ties are hard to maintain in track protected by automatic signals on account of the difficulty of securing proper insulation. Others are so designed that it is hard to apply the rail to them with anything but a bolt and nut, which by many roads is not considered satisfactory. Such a fastening might become so damaged by salt brine from refrigerator cars, the loosening of the nuts, or derailment of an engine or car, that new ties and fastenings would have to be applied before the track could be made safe. The following points must be considered in deciding on any steel or concrete tie:

1. Original cost.
2. Cost of handling as determined by its weight, shape and kind of fastening.
3. Safety of the appliance by which the rail is fastened.
4. Labor required to fasten the rail to tie and keep such fastenings in proper condition.
5. Durability and efficiency of the insulating material in all kinds of weather on all kinds of roadbed and under all kinds of traffic.

The report suggests that a steel or concrete tie somewhat wider and not so deep as the standard tie might answer the purpose. A tie of this shape would secure the same amount of bearing from the rail and on the roadbed with a fewer number per mile, and less material would be required in the ties. Such a tie would also require less ballast, which is an important item with the expensive ballasts which are being used on heavy traffic roads.

Committee:—L. C. Ryan (C. & N. W.), Chairman; P. J. McAndrews (C. & N. W.), F. R. Layng (B. & L. E.), John D. Boland (U. P.), F. D. Harrigan (Pere Marquette), John O'Leary.

Discussion: Mr. Ryan—Most of the steel ties the committees examined cost $2.50 to $3.50 and the life was estimated at 25 to 35 years. Our oak ties now cost more than $1.00.

Mr. Muff—We have in use 106 insulated steel ties on a curve on a heavy grade and under heavy traffic. They have not slewed and have not required any maintenance in two months after the ties were properly surfaced.

A. C. Rupp (C. C. C. & St. L.)—We have in service about one mile of Carnegie steel ties. We had a derailment affecting both steel and wooden ties; the steel was undamaged, but two-thirds of the wooden ties were destroyed.

T. Thompson—I believe it is economical to use steel ties in some form in cinder pits or in locations where wood is rapidly burned by hot cinders.

Several patented steel ties were then described and their relative merits discussed.

Mr. Foley—We have used three types of concrete ties. Two have failed, but the third is still in track and apparently giving satisfaction. I doubt whether concrete ties will ever be used for heavy main line traffic, but they may be developed for use in passing tracks or industrial tracks.

The report was accepted as information.

TREATED TIES.

Treated ties are usually received from the treating plant a very short time after they receive treatment. On ties treated

with creosote there is usually a considerable amount of oil which is not yet absorbed by the wood. It is considered best to lay such ties in track immediately if possible, especially if they are laid in gravel, rock or burnt gumbo ballast, with a box dressing. The ties in such ballast are surrounded so as to prevent air and moisture entering to any great extent. In most cases, however, it is necessary for various reasons to pile the ties before placing them in track. Care should be taken in unloading ties on single track to place them on the side opposite telegraph line, if possible, and in any event at least 50 ft. from telegraph poles or crossing or station signs, to eliminate danger of fire. Ties treated with creosote should be piled close to prevent air and moisture from coming in contact with them. Unlike untreated ties or ties treated with zinc chloride, it is not considered necessary to place old ties on the ground under creosoted ties. Sod should be removed for a distance of 15 ft. from the pile to prevent fire being carried to the ties. The number of ties to be placed in a mile of track determines largely the size of piles. Most roads, however, have a standard for piling creosoted ties which calls for two ties as sleepers, with 77 or 78 ties piled in close layers cross-box style. The committee suggests an alternate method for the consideration of the association. In this method the ties are all laid in the same direction, either parallel with or perpendicular to the track. The piles rests on two sleepers and each course of ties contains one less than the course below, breaking joints and providing a slope on both sides which will shed water easily. It is thought that this method of piling will reduce the expense and will give equally as good results as the more usual method. By putting 12 ties in the bottom tier the pile will contain 78 ties. Smaller piles can be made by starting with a smaller number in the bottom tier. One advantage of this method of piling is that it is easy to discover if any ties have been stolen, and if it is considered necessary to protect them a single strand of wire can be fastened to all the outside ties. Ties treated with zinc chloride should be piled so as to expose their surface as much as possible to secure rapid absorption, since the wood is more thoroughly impregnated with the zinc chloride as it dries.

Committee:—J. H. Lynch (C. R. I. & P.), Chairman.

EMERGENCY STOCK OF TOOLS.

The prevalent practice of permitting section foremen to carry surplus tools and track material in stock in the tool house results in a large amount of material being stored in this way which represents a large idle investment. The chairman of the committee suggests a method for eliminating this practice, which is agreed to by all the members of the committee. The suggestion includes the following points:

1. Suitable buildings should be provided at the roadmaster's headquarters in which a specified number of surplus tools and a considerable amount of small track material, such as bolts and spikes, could be kept. This material could be secured by the foreman upon requisition, and if desired, the roadmaster's clerk could keep a record by sections of the material furnished each foreman.

2. Worn out tools which cannot be repaired by the foreman should be sent to headquarters to be exchanged for new ones. This will enable the roadmaster's department to know what disposition is made of old tools. They can be inspected under the roadmaster's supervision and those which cannot be repaired shipped to the storekeeper, and the parts which may be of use sent to the shop for repair. This would enable all old tools from a roadmaster's territory to be sent to the storekeeper in one shipment instead of many as at present.

3. The roadmaster can make one or two monthly requisitions on the storehouse for tools and material, securing on this requisition a 30 days' supply. This eliminates the necessity for the numerous requests by section foremen.

Committee:—J. H. Jones (A .T. & S. F.), Chairman; J. E. Sampson (B. & M.), B. A. West (A. T. & S. F.), J. T. Martin (D. T. & I.), Wm. J. McDermot (C. & N. W.).

NEW APPLIANCES.

The committee includes in its list of new appliances some devices which are not entirely new, but which have undergone such radical changes in recent years that they deserve renewed attention. The following devices are included in the report:

1. Shoulder tie plates.—The committee recommends shoulder plates 7½ in. x 9 in., extending 2¼ in. beyond the base of the rail on the outside and 1¾ in. on the inside, the plate to be ½ in. thick at the outside edge of the rail base, tapering to 7/16 in. at the inside edge. The plate should be corrugated or flanged on the bottom to prevent rattling. The use of tie plates is recommended on all main line tracks and switch leads and turnouts where traffic is heavy.

2. Rail anchors.—The anchors with the fewest number of parts are recommended, as they are easy to apply, can be readily removed when the rail is changed, and are applied without loss or breakage.

3. Solid manganese frogs.—The use of solid manganese spring rail frogs under heavy traffic at high speed, and some form of hard frog on all heavy traffic switching leads is recommended.

4. Manganese steel points.—Solid manganese steel or a similar material is recommended for use in switch points, the full length of the point to be made of the special steel where traffic is heavy enough to warrant the expense.

5. Switch slide plates.—Gage plates should be at least 3¼ in. x 6 in., insulated when necessary and turned up at both ends to form a shoulder for bracing. Slide plates should be 12 in. long and turned up at the ends. Braces should be placed on every tie from the gage plate to the heel of the switch point. Special plates punched to order should be used on joint tie back of the heel of the switch point to the point where standard tie plates can be used. A malleable iron casting should be made to fit between the stock rail and the switch point, to be bolted to the stock rail.

6. New automatic switch stand.—Automatic switch stands are recommended for yards to prevent derailments caused by running through switches equipped with rigid stands.

7. Motor hand cars for section men.—The use of gasoline motor hand cars of simple two-cycle design, weighing between 650 and 700 lbs. is recommended.

8. Screw spikes.—The use of screw spikes is favored.

9. Hydro-carbon for snow melting.—The use of hydro-carbon, a highly inflammable liquid, for melting snow around switches, by pouring out the liquid and setting fire to it, is mentioned as an experiment worth consideration.

10. Ballast sprinkler.—A car equipped for sprinkling stone ballast is described and illustrated. This car was described in the *Railway Age Gazette* of June 16, 1911, page 1419, and the arguments in favor of its use were given in that description.

11. Sod line trimmer and roller.—A new sod line trimmer and roller is described and illustrated, the device being the same as that mentioned in the *Railway Age Gazette* of June 16, 1911, page 1422.

12. A railway ditcher.—A ditcher is described and illustrated which has all the qualities of a steam shovel and can be used for sloping and ditching wet cuts, removing slides, handling rock, timber or ties, and can also be used as a light wrecking crane. It can be handled on the deck of an ordinary flat car, or can be placed on the ground and used in the same manner as the steam shovel. It is recommended for stripping the top soil from gravel pits, and it is thought that it could be more widely adopted.

Committee:—A. M. Clough (N. Y. C. & H. R.), D. Foley (Mich. Cent.), M. H. Connolly (Cinn. No.), T. Thompson (A. T. & S. F.), J. M. Meade (A. T. & S. F.), A. W. Tabert (C. & N. W.).

ELECTION OF OFFICERS.

New officers elected are as follows: President, A. M. Clough, New York Central & Hudson River, Batavia, N. Y.; first vice-president, T. F. Donahoe, Baltimore & Ohio, Glenwood, Pa.;

second vice-president, M. H. Connolly, Cincinnati Northern, Van Wert, Ohio; secretary-treasurer, L. C. Ryan, Chicago & Northwestern, Sterling, Ill.; member of executive committee, James Sweeney, Chicago & Eastern Illinois, Danville, Ill.

The next convention will be held at Buffalo, N. Y., September 10, 1912.

At a meeting of the Track Supply Association, the following officers were elected for one year: President, W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y.; vice-president, A. H. Weston, Lackawanna Steel Company, Buffalo, N. Y.; secretary-treasurer, F. A. Preston, P. & M. Company, Chicago; executive committee, Walter H. Allen, Pennsylvania Steel Company, Steelton, Pa.; Thomas E. Vaughn, Vaughn Rail Support Company, St. Louis, Mo.

EXHIBITS.

The following firms made exhibits in connection with the convention:

Adreon Manufaceuring Company, St. Louis, Mo.—Clark tie plate; Security rail brace; Boss nut lock. Represented by E. L. Adreon, Jr., and D. R. Niederlander.

Ajax Forge Company, Chicago.—Ajax manganese steel one-piece guard rail; Ajax rail steel braces. Represented by F. B. Bradley and H. C. Hutchins.

American Hoist & Derrick Company, St. Paul, Minn.—Moving pictures of American Railroad Ditcher in operation. Represented by J. J. Cox and Edward Coleman.

American Valve & Meter Company, Cincinnati, Ohio.—Anderson interlocking switch stand; Anderson economy switch stand; Safety point lock. Represented by J. T. McGarry and F. C. Anderson.

Appleyard, G. T., Grand Rapids, Mich.—Appleyard and Robson compound railway tie. Represented by G. T. Appleyard and A. M. Robson.

Buda Company, Chicago.—Motor cars; track drills; track jacks; tool grinders; switch stands. Represented by S. T. Hatcher and T. H. Wheeler.

Continuous Frog & Crossing Company, St. Louis, Mo.—Model of Continuous rail frog. Represented by William G. Brown and R. B. Pender.

Cook Standard Tool Company, Kalamazoo, Mich.—Track appliances and descriptive literature. Represented by Eugene Cook and E. Edelmann.

Chicago Pneumatic Tool Company, Chicago.—Rockford railway section and inspection gasoline motor cars; pneumatic tools; electric tools for drilling, grinding and screwing spikes in ties. Represented by C. E. Walker and E. S. Cole.

Fairbanks, Morse & Company, Chicago.—No. 26 Fairbanks-Morse section gang car; No. 28 and No. 30 Fairbanks-Morse inspection cars; forty-ton geared ratchet jacks; forty-ton Duff ratchet forged steel hydraulic jacks; other track jacks. Represented by Lorenzo Norvell, E. E. Penbray, A. T. Young, E. M. Fisher, D. J. Higgins and C. F. Fuggit.

Goldie, William, Jr., & Company, Bay City, Mich.—Samples of Goldie Perfect tie plugs. Represented by William Goldie, Jr.

Hayes Track Appliance Company, Richmond, Ind.—Hayes derails. Represented by William Harding Davis.

Indianapolis Switch & Frog Company, Springfield, Ohio.—Models of solid manganese frogs and crossings and test bars of steel used; photographs of installation and complete line of blue prints showing details of construction. Represented by E. C. Price.

Kalamazoo Railway Supply Company, Kalamazoo, Mich.—General display of track devices. Represented by John McKinnon and Lewis O'Key.

Lackawanna Steel Company, Buffalo, N. Y.—Abbott rail joint plate; Abbott insulation joint; anti-creeper, double strength, equal resistance in either direction. Represented by A. H. Weston.

P. & M. Company, Chicago.—P. & M. anti-rail creeper; bond wire protectors. Represented by P. W. Moore, F. A. Preston, D. T. Hakberg and George E. Johnson.

Pennsylvania Steel Company, Steelton, Pa.—Design No. 160 Manard frog; Steelton Positive switch stands; main line adjustable switch stand; New Century adjustable and non-adjustable switch stands. Represented by Robert E. Belknap, N. E. Salsich, G. S. Vickery, W. H. Allen and E. Dwitt.

Rail Joint Company, New York.—Continuous, Weber and Wolhaupter rail joints. Represented by William E. Clark, H. O. Holloway, Charles Jenkinson and W. J. Boyer.

Railroad Supply Company, Chicago.—Wolhaupter and Harriman spike plates and track bolts. Represented by M. J. Camerford and W. A. Dayton.

Railway Age Gazette, New York.—Copies of *Railway Age Gazette, Signal Engineer* and *Signal Directory*. Represented by John N. Reynolds and H. H. Simmons.

Railway List Company, Chicago.—Copies of paper. *Railway Engineering & Maintenance of Way* and *Official List of Railway Officials*. Represented by W. E. Magraw, L. F. Wilson and K. L. Van Auken.

Ramapo Iron Works, Hilburn, N. Y.—Switch stands; solid rolled shoulder tie plates; enameled interlocked switch stand targets. Represented by W. C. Kidd and Arthur Gemunder.

Reinforced Rail Joint Company, S. Louis, Mo.—Compromise and insulated joints. Represented by H. F. Reelch, William G. Brown and R. B. Pender.

Sellers Manufacturing Company, Chicago.—Sellers Anchor Bottom tie plates. Represented by J. T. Markham and L. S. Gordon.

Southern Railway Supply Company, St. Louis, Mo.—Saunders car stopper. Represented by E. Catlin, Jr., and L. E. Truxler.

Templeton Kenley Company, Ltd., Chicago.—Simplex track jacks. Represented by A. E. Barrow.

U. S. Wind Engine & Pump Company, Batavia, Ill.—Switch stands. Represented by C. E. Ward.

Universal Metallic Tie Company, Salt Lake City, Utah.—Universal metallic ties. Represented by B. S. Rupp.

Vaughan Rail Support Company, St. Louis, Mo.—Samples of Vaughan rail support and model of Champion concrete fence mold. Represented by Theodore E. Vaughan and J. C. Sterling.

Verona Tool Works, Pittsburgh, Pa.—Diamond stone tamping bar; master gage for testing track gages. Represented by Henry Fischer.

There are about 375 miles of railways in the Dominican Republic, of which 225 miles are private.

NEW RAIL RELAYING MACHINE.

A rail relaying machine has been in use on the Aurora division of the Burlington for some time which differs in several respects from other machines built for this purpose. It consists essentially of a 4½-in. x 9-in. timber beam resting on a light standard gage push car about 4 ft. longer than the common car and with platform removed. This beam is supported on a ball bearing pivot at the front end of the car and moves on a nest of five rollers concentric with this pivot at the rear end. The beam is strengthened by a steel truss rod which passes through the

Rail Relaying Car in Service.

vertical center post. A 1½-in. rope, with a rail tong at one end, passes over a pulley near the front end of the beam and over another pulley in the center post, to a reel mounted on a platform at the rear end, upon which it is wound. Three hundred pounds of old rail are placed on this platform to balance the car when it is carrying a rail with the tongs at the front end. A ladder is provided near the front end of the beam, on which a man rides when a rail is not being handled in order to maintain the balance. Eight men are required to operate the car. Two men on the platform raise and lower the rail with the reel, while two other men working on the ground at the rear end swing the car sideways and move it forward. One man handles the tongs at the front end, another one at the front end assists in swinging the car when loaded, and balancing it

Rail Relaying Car Lifting a Rail.

while empty, while a man is required at each end of the rail to steady it and guide it into place.

Two important advantages of this machine are that it runs on the rails already laid and that rail can be laid to equal advantage on either or both sides at the same time. At the time at which these views were taken both rails were being laid at the same time and all work was cleaned up as the gang moved forward.

While it is not so important that the car be got off the track hurriedly, as a steel gang is always working under flag protection, this car is readily lifted off the track in two pieces

by the men using it. The speed in relaying rail with this car is the same, or a little faster, than when using tongs. However, but eight men are required, where ordinarily, with 100-lb. rail, such as was being laid at this point, 18 or 20 men are required to handle it with tongs, showing a saving of 10 to 12 men with the use of the machine. On the afternoon of July 24, 4,428 track ft., or 8,856 lineal ft. of rail were laid with it between 1:20 and 4:50 p. m. This resulted from an attempt to see what could be done under the most favorable circumstances. All traffic was thrown on to other tracks, the afternoon was cool and cloudy, and half the spikes had been pulled in advance. The gang consisted of 61 men; four pulling spikes, six throwing out rail, six adzing ties, eight on the car, one placing expansion shims, one distributing bolts and spikes, 20 bolting up, 12 spiking, two flagmen, and a water boy, in addition to the timekeeper, assistant foreman and foreman. The rail was fully spiked and bolted, but the old rail was not uncoupled.

This machine was devised and built by Lew Gudgell, master carpenter of the Chicago, Burlington & Quincy at Galesburg, Ill., and is being used on the Aurora division of the Burlington under the direction of W. S. Kirby, superintendent, and E. Keough, roadmaster, to whom we are indebted for assistance in gathering this information.

MAINTAINING AUTOMATIC SIGNALS WITH SECTION FORCES.

For the past year the Union Pacific has been maintaining automatic block signals on double track with the regular section forces on that part of the Nebraska division between Kearney, Neb., and North Platte, a distance of 95 miles. Previous to this time the signals in this territory were maintained by a separate corps of men working under a district maintainer and independent of the track department, as on other parts of the system. The sections on this district are 9 miles long, and each section foreman has an assistant and from 10 to 15 men. At the time the maintenance was turned over to the track department the district maintainer was made an assistant roadmaster, and the maintainers were made assistant foremen, except in one or two cases where maintainers with track experience were made foremen. The pay of the foremen was raised at the same time from $65 to $75 per month. While the former maintainers have practically all left by this time, the section foremen have rapidly learned the work.

Previous to taking up the signal work nearly all the foremen had enrolled in the correspondence courses of signaling provided by the educational bureau of the Union Pacific (see *Railway Age Gazette* for June 16, 1911, page 1424). These lessons were of much help to the men in handling their new duties. As was to be expected, the number of signal failures increased at first, but they came down to normal within a short time. Signal maintenance has largely been regarded as a work requiring mechanical and electrical knowledge and skill beyond those of the average foreman, but they have mastered it readily.

This method of maintaining signals with the track forces has several advantages. In the first place, it eliminates the double daily inspection, as the foreman can inspect the signals at the same time that he is making his track inspection. Again, under the old system it was necessary for the maintainer to call on the section forces for help whenever he had any heavy work to do, and in such cases much time was lost by the men in waiting for one another. The presence of the men from the two departments also frequently led to trouble.

The increase in salary offered an incentive to the better class of foremen to study the operation of signals and increased their efficiency as a class. This plan has worked out even better than was expected by the local officers, and is regarded by them as a success. It has been carried out under the direct supervision of Thomas Scott, roadmaster.

WOOD TREATED WITH PRESERVATIVES.

A bulletin published by the United States Department of Agriculture, Forest Service, on quantity of wood treated with preservatives in United States during 1910, shows that the 71 plants reporting treated 17,933,918 hewed ties and 8,500,657 sawed ties during that year. In addition to these standard ties, there were also treated by these plants 9,383,366 board feet of switch ties, 1,402,109 board feet of bridge ties and 7,826,749 lineal feet of piling. Fifteen railways reported the operation of timber-treating plants, and many others reported that their supply was being treated by commercial plants. The report shows a tendency toward the treatment of certain classes of material which have heretofore been little treated, including tie plugs, pole brackets, fence posts and tunnel wedges. The following is a table showing quantities of wood preserved in the United States during the last four years prepared from statistics gathered by the Forest Service and the Wood Preservers' Association:

Preservatives.	Crossties. *Cu. feet.*	Piling. *Cu. feet.*	Poles. *Cu. feet.*	Paving blocks. *Cu. feet.*
Creosote:				
1907[1]	17,252,622	4,423,611	[4]	2,874,560
1908[1]	28,861,260	6,059,919	[4]	1,260,020
1909[2]	29,830,080	4,421,726	659,664	2,994,290
1910[2]	44,525,529	5,219,254	265,597	4,692,453
Total	120,469,491	20,124,510	925,261	11,821,323
Zinc chloride:				
1907[1]	29,594,295	[4]	[4]	[4]
1908[1]	25,920,690	[4]	[4]	[4]
1909[2]	24,153,162	[4]	[3]	[4]
1910[2]	27,587,583	[3]	[3]	[4]
Total	107,255,730	.....	.....	.....
Zinc creosote:				
1907[1]	7,037,010	152,541	[4]	[4]
1908[1]	9,781,590	426,610	[4]	[4]
1909[2]	8,095,794	[4]	[4]	[4]
1910[2]	6,354,219	38,392	[4]	[4]
Total	31,268,613	617,543	.....	.....
Grand totals of materials by classes	258,993,834	20,742,053	925,261	11,821,323

Preservatives.	Construction timbers. *Cu. feet.*	Cross-arms. *Cu. feet.*	Lumber and miscellaneous. *Cu. feet.*	Totals of each treatment by years. *Cu. feet.*
Creosote:				
1907[1]	1,687,450	238,742	4,561,327	31,038,312
1908[1]	2,657,398	480,640	6,065,717	45,384,954
1909[2]	4,902,311	41,764	417,787	43,267,622
1910[2]	7,801,272	88,069	2,682,713	65,274,887
Total	17,048,491	849,215	13,727,544	184,965,775
Zinc chloride:				
1907[1]	325,886	[4]	74,564	29,994,745
1908[1]	640,606	[4]	95,900	26,657,196
1909[2]	320,891	[4]	2,333	24,476,386
1910[2]	541,514	[4]	71,060	28,200,157
Total	1,828,897	.....	243,857	109,328,484
Zinc creosote:				
1907[1]	[4]	[4]	5,691	7,195,242
1908[1]	95,700	[4]	35,858	10,339,758
1909[2]	62,918	[4]	43,699	8,202,411
1910[2]	181,143	[4]	30,646	6,604,400
Total	339,761	.....	115,894	32,341,811
Grand totals of materials by classes	19,217,089	849,215	14,087,295	326,636,070

Total material treated each year:	*Cu. feet.*
1907	68,228,299
1908	82,381,908
1909	75,946,419
1910	100,079,444

[1] Figures furnished by Wood Preservers' Association.
[2] Figures compiled by the Forest Service.
[3] Figures, if used, would reveal operations of reporting firms.
[4] No statistics collected.

A law of the Dominican government provides that 30 per cent. of the internal revenues be applied to the payment of interest on capital invested in the building of railways, whether by private corporations or borrowed by the government. It further provides that interest may be paid up to 6 per cent.; that a bonus of $3,200 be allowed for each mile constructed, and that this portion of the revenues shall not be used for any other purpose.

General News Section.

The station of the Denver & Rio Grande at Thistle Junction, Utah, was destroyed by fire September 6; loss, including seven freight cars, $25,000.

The government has begun suit in Boston against the Boston & Maine for eight violations of the safety appliance law, said to have been committed in April last.

Three thousand freight cars, which for some months have been stored on one of the main tracks of the Petersburg cut-off of the Pennsylvania, near Altoona, have been put into service.

Announcement has been made by H. B. Perham, president of the Order of Railroad Telegraphers, at Denver, Colo., that an increase of 5 to 10 per cent. in the wages of operators has been authorized on the Denver & Rio Grande.

At Boston, September 6, Mr. Grahame-White, carrying one passenger, flew across Boston Harbor and back, a total distance of 33 miles, in 27 minutes, 25 seconds. At Etampes, France, September 8, Mr. Halles flew continuously for 14 hours, 7 minutes, making in that time a distance of 777 miles.

The real estate committee of the board of trade of Little Rock, Ark., has adopted resolutions expressing its appreciation of the efforts of President Bush of the Missouri Pacific to improve and expand railway service in Arkansas, and urging fair and just treatment of the roads in all of their relations with the people.

Firemen on the Erie Railroad have made demands for increased rates of pay which will involve an increase of between 10 and 12 per cent. A year ago the company granted a 10 per cent. increase of wages to its firemen and present demands, if granted, will mean an advance of more than 20 per cent. in two years.

Four trains of the Louisville & Nashville running between New Orleans and Mobile along the coast of the gulf of Mexico have been fitted with wire mosquito screens, the screens being provided in all of the windows and doors of all the passenger cars. The trains are numbers 7 and 9 westbound, and 8 and 10 eastbound.

The gasolene electric passenger car recently bought by the Bangor & Aroostook is now running regularly between Squa Pan and Van Buren, 48 miles. The train consists of this car and a trailer containing baggage accommodations. The time taken for the trip is 2 hours 12 minutes, the same as heretofore with steam power.

An appeal in the Union Pacific-Southern Pacific merger suit, which was decided in favor of the railways last June, was filed by the government in the United States Court at Salt Lake City, September 9. The government contends that the court erred in holding that the Union Pacific was not competing for traffic with the Southern Pacific, and in holding that the purchase by the Oregon Short Line of 51 per cent. of the Salt Lake route was not in violation of law.

Under a new contract between the Missouri Pacific and the Western Union Telegraph Company, each company will pay the other for all services rendered. All telegrams sent under the franks issued to officers of the road will be charged against the railway; and an order has been issued requiring the elimination of unnecessary telegraphic reports or communications. Officers and employees must use the telegraph only when the business of the company actually demands it, and when train mail will not serve the purpose.

Col. B. W. Dunn, chief inspector of the Bureau of Explosives, 30 Vesey street, New York City, has issued a four-page pamphlet describing a number of accidents which have occurred in the handling of explosives, acids, inflammable gases, etc., with a view to showing how different kinds of accidents can be prevented. Rough handling of cars in switching is still complained of quite frequently, and the necessity of severe punishment for such carelessness is pointed out. Col. Dunn will furnish copies of this bulletin at 3 cents each; $2 a hundred, or $15 a thousand.

The civil suit of the Illinois Central against John M. Taylor, former general storekeeper of the road, who, with F. B. Harriman, Charles L. Ewing, O. S. Keith and Joseph E. Buker, all former officers of the Illinois Central, was prosecuted in the car repair fraud cases about a year ago, has been dismissed, following an agreement before Judge Heard of the Circuit Court at Chicago. The civil suits against Mr. Harriman and Mr. Ewing were settled some time ago, and it is understood that negotiations are pending for settlement of the suits against the other two men.

At Seattle, Wash., the manager of an electric railway has been sentenced to thirty days' imprisonment for violation of an order of the Public Service Commission limiting prices to be charged for fares on street cars in the city of Seattle. The defendant appealed to the superior court and was released on $500 bond. For sometime an acrimonious controversy has been going on between the railway company and the citizens; and after a federal judge granted a temporary injunction which favored the railway, a mass meeting was held which denounced the judge; and a crowd in the street hanged him in effigy.

A press despatch from Salt Lake City says that the Interstate Commerce Commission recently authorized an express company to make a special rate on a carload of binder twine from Chicago, and thereby has helped save the wheat crop on 50,000 acres of land near Idaho Falls. The farmers suddenly found that their wheat was ripening so fast that it must be cut at once. No binding twine could be had at local supply houses, and the matter was placed before the commission. The petition was granted and a car of twine was rushed through on passenger time. Within 30 minutes after its arrival at Idaho Falls the twine was being distributed and the gathering of the wheat began. It is rumored that a bill will be presented in Congress at the next session making an appropriation of $18,000,000 for the construction of a long distance telephone line connecting the office of the Interstate Commerce Commission in Washington, with each farm in the country which does an interstate business. With suitable means of communication that twine might have been started at least a half day earlier.

The Motives of Strikers.

Conservative workmen frequently acquiesce in a strike vote on the theory that, while their chance of gaining much is very small, their chance of sustaining any important loss is still smaller. Mr. Kruttschnitt puts it in this way:

The rank and file of the men of the Harriman Lines know that we have for years made it a point to treat them fairly, give them the best wages being paid, provide a pension system out of the road's treasury without a cent of expense to them and provide for their promotion on the merit and seniority basis. But there are always some young fellows on the road who like to take the role of leaders and agitate matters. They stir up the men who are otherwise contented by means of alluring pictures of what they might get by some new scheme. You cant blame the men much for it. They are just like a small boy without a thought of candy in his head. You take him into a candy shop and point out the loaded shelves and ask how he would like to have some of that, and you are in trouble at once.

Centennial of Steam Navigation on the Mississippi.

At Elizabeth, Pa., on the Monongahela river there has been launched a replica of the New Orleans, the first steamboat to navigate the waters of the Ohio and the Mississippi. It is to head the river pageant that will be held next month to commemorate the centenary of steam navigation on our inland rivers.

The New Orleans, called at first the Enterprise, was built at Marietta and sent to Pittsburgh to be provided with engine and stern wheel of Robert Fulton's design. The little boat of some 350 tons burden cost $40,000 to build, and left Pittsburgh on its trial trip October 11, 1811. Thereafter for three years it made regular trips between New Orleans and Natchez, until it was wrecked. Up to the year 1817 there were 12 steamboats on the Father of Waters. In 1817 the average of speed against stream of a steam vessel heavily laden was about 60 miles a day. Charles Dickens, using a succession of these boats in 1840, said that he

was told to keep as far aft as possible, "because the steamboats generally blew up forward." The apogee of steamboat navigation on the Mississippi was reached in 1859, when there were 32 boats, "all fine passenger steamers," plying between St. Louis and New Orleans. Their total tonnage was 48,800.

After the war a New Orleans newspaper declared there were not more than eight boats trading between Cincinnati and New Orleans, their aggregate tonnage amounting to 10,000. The extent to which rail competition made inroads upon the steamboat traffic is shown by the compilation of statistics for the principal landings on the Ohio river in 1869 and 1886. In the former year the value of shipments was $591,754,000, and 17 years later it had declined to $253,481,783, less than half the former amount. But today the Ohio and its tributaries are transporting each year some 15,000,000 tons of coal, grain, lumber and the output of the iron and steel mills and other establishments upon their teeming banks.—*Philadelphia Public Ledger.*

Employees' Passes on the Pennsylvania Lines.

Every employee who has been in the service of the Pennsylvania Lines west of Pittsburgh for three years is to receive a division pass for himself. For 10 years' continuous service the pass will include employee and wife. For 15 years' continuous service a pass for employee and wife will be given either over the Northwestern system or the Southwestern system, according to which one the person is employed by. For 20 years' service a pass will be granted over all Pennsylvania lines west of Pittsburgh to employee and wife.

The order includes all employees except common laborers and porters. This class of workmen will be given a division pass after 10 years' service, and after 20 years' will get a pass for self and wife. On entering the service of the company a pass will be given to each employee between his home and work. After one year the pass will include his wife. In the case of division passes, the employee may choose on which division he wants the pass if he lives at a point which is on more than one division.—*Pittsburgh Post.*

Illumination of Tunnels.

An arrangement for energizing electric lights on passenger station platforms, through the means of a circuit-closer actuated by an approaching train as it passes the last signal before reaching the station, which is in use on the Southern Pacific, in California, was described in the *Railway Age Gazette* of August 18, page 347. This arrangement is now being installed at a number of tunnels on the lines of the Southern Pacific in that state. The lights are provided in the tunnel both as a convenience to the engineman and as a warning to any pedestrian who may be in the tunnel.

The Western Shopmen.

No strike has as yet resulted from the refusal of the managements of the Harriman Lines, the Illinois Central and the Chicago & North Western to recognize the federations of shop employees on their respective systems. Repeated reports have been current that the employees of the Illinois Central were on the verge of a strike, but on each occasion when the time came on which it was said the strike order would be issued, it was not forthcoming.

Differences of opinion have developed between the officers of the federation and those of the individual unions which compose it. J. F. McCreary, president of the Illinois Central federation, is said to have been requested by the officers of the various organizations to withdraw his demand for recognition of the federation and to have refused to do so. Previous to a conference on September 10 Mr. McCreary said there was going to be a strike on the Illinois Central, and it was stated that full power to act had been delegated to the officers of the federation. It next developed that a second vote of the shop men was being taken to determine whether or not they still favored a strike. It seems that the machinists, who are the best organized of the Illinois Central's shop employees, are opposed to quitting work now, and P. J. Conlin, vice-president of their international association, declared that he would not sanction a strike or give the power to declare one to officers of the federation.

The chambers of commerce of Omaha, Neb.; Denver, Colo.; and Houston, Tex., have adopted resolutions criticising the demands of the Harriman Lines' shop employees and opposing a strike. In the course of its resolutions the chamber of commerce of Houston said:

"We have invited and had before us representatives of the railway company and representatives of the labor organizations directly involved in the controversy. We have thoroughly discussed the situation with said representatives and, from the information obtainable from them, coupled with the demands of the labor organizations concerned, it is our frank opinion that many of the demands made upon said railway system go beyond the legitimate bounds which conscientious employees, however much interested, should properly demand as concessions from their employers."

The Signal Engineer's Special Train From New York.

The Signal Engineer has arranged for a special train from New York on the occasion of the annual convention of the Railway Signal Association at Colorado Springs, October 10-12. It is scheduled to run to Chicago as a second section of the Pennsylvania Limited, leaving New York Saturday, October 7, at 10:50 a. m., and from Chicago over the Rock Island as a second section of *The Signal Engineer* special from Chicago. The usual connections will be made from Washington and Baltimore, and the train will be due in Chicago Sunday morning at 8:46; leave Chicago at 9:30 a. m., and reach Colorado Springs Monday afternoon at 2:55. The train will be composed of a compartment observation car, three sleeping cars, a dining car (with a la carte service) and a baggage car. The railway fare from New York to Colorado Springs (one way) will be $47.60; lower berth, $11; upper berth, $8.80; section, $19.80; stateroom, $31, and drawing room, $39.

Passes will be honored on this train on both roads. A preliminary canvass indicated that enough members and guests would enroll to insure the success of the movement. Should the number not meet the requirements of the railway company, arrangements will be made to attach two or three special sleeping cars to the Pennsylvania train leaving New York October 7 at 8:04 a. m.; and these cars will, in turn, be attached to the Rock Island special at Chicago.

Orders for reservations may be sent to the office of *The Signal Engineer,* 83 Fulton street, New York. In New York City the Pennsylvania Railroad will deliver tickets to intending passengers and collect payment therefor. Persons expecting to board the train at any place other than New York should buy their railway tickets in the usual way, and pay Pullman charges on the train.

Master Car and Locomotive Painters' Association.

The forty-second annual convention of the Master Car and Locomotive Painters' Association was opened Tuesday morning at Atlantic City, N. J., by the president, J. H. Pitard, of the Mobile & Ohio.

F. W. Brazier, superintendent of rolling stock, N. Y. C. & H. R., addressed the assembly at the request of the president. In his remarks he laid particular stress on the value of these conventions to not only the men attending them but to the roads on which the men are employed. He mentioned the fact that the New York Central Lines firmly believe in having their foremen attend their respective conventions to the extent of providing their transportation and considering the time thus spent as time spent for the company. Special mention was made of the younger men present and to them he told of what value just such a convention as this had been to him from the time he was a practising mechanic up to his present position. He spoke of the difficulty in obtaining young men to enter the painters' trade in railway work, with the idea of working up to the important positions, laying their lack of interest to the fact that the young men of today do not realize the importance of beginning at the bottom and working up. Mr. Brazier closed his remarks by quoting several clippings he has collected under the head of Success. Eugene Chamberlain, also of the New York Central, followed this address with a few remarks.

At the close of the first day the registration showed about 200 names, indicating this convention is a record breaker, the members hailing from the territory within the limits of from Canada to Texas and from Maine to Washington. The supply men pro-

vided an interesting program for the entertainment of the members and their friends. The following supply companies are represented:

Acme White Lead & Color Works, Detroit, Mich.
American Roll Gold Leaf Company, Providence, R. I.
Anglo-American Varnish Company, Newark, N. J.
Aquart Manufacturing Company, St. Louis, Mo.
Atlas Paint Company, Nashville, Tenn.
Ball Chemical Company, Pittsburgh, Pa.
Cheesman & Elliot, New York.
Chicago Varnish Company, Chicago.
Detroit Graphite Company, Detroit, Mich.
F. W. Devoe & C. T. Raynolds Company, New York.
Jos. Dixon Crucible Company, Jersey City, N. J.
Flint Kote Manufacturing Company, Boston, Mass.
Flint Varnish Works, Flint, Mich.
Flood & Conklin Company, Newark, N. J.
Glidden Varnish Company, Cleveland, Ohio.
N. C. Graves Company, Philadelphia, Pa.
Hildreth Varnish Company, New York.
Kay & Ess Company, Dayton, Ohio.
Ideal Manufacturing Company, Chicago.
Imperial Car Cleaner Company, Newark, N. J.
Chas. R. Long, Jr., Company, Louisville, Ky.
Louisville Varnish Company, Louisville, Ky.
Lowe Bros., Dayton, Ohio.
John Lucas & Company, Philadelphia, Pa.
Mamolith Carbon Paint Company, Cincinnati, Ohio.
Murphy Varnish Company, Newark, N. J.
Patton Paint Company, Newark, N. J.
Penna. Specialty Company, Philadelphia, Pa.
Pratt & Lambert, New York.
Sherwin-Williams Company, Cleveland, Ohio.
James B. Sipe & Company, Pittsburgh, Pa.
Edward Smith & Company, New York.
St. Louis Surfacer & Paint Company, St. Louis, Mo.
M. B. Suydam Company, Pittsburgh, Pa.
Tousey Varnish Company, Chicago.
U. S. Metal & Manufacturing Company, New York.
Valentine & Company, New York.
Wadsworth-Howland Company, Chicago.
Wolfe Brush Company, Pittsburgh, Pa.
C. H. Willey, New York.
Wilson Remover Company, New York.
J. L. Whiting—J. J. Adams Company, Boston, Mass.
Yarnell Paint Company, Philadelphia, Pa.

Western Society of Engineers.

At the regular meeting of the Western Society of Engineers, held at Chicago on September 6, W. C. Armstrong presented a paper on The New Passenger Terminal of the Chicago & North Western Railway; at an extra meeting on September 13 a paper was presented by H. Gansslen on Ball Bearings for Heavy Loads; at an extra meeting on September 20, J. A. Peabody will present a paper on The Signaling and Interlocking of the New Passenger Terminal, Chicago & North Western Railway; and at an extra and joint electrical meeting on September 27, S. G. Neiler will present a paper on The Electrical and Mechanical Equipment of the New Terminal, Chicago & North Western Railway.

Society of Railway Financial Officers.

At the annual meeting of the Society of Railway Financial Officers, held in St. Paul, Minn., September 12-14, officers were elected as follows: President, H. C. Ausley; first vice-president, Odell S. Smith, and second vice-president, Joseph B. Lacy. H. C. Ausley, Odell S. Smith, Arthur B. Jones, Joseph B. Lacy and T. H. B. McNight were elected members of the executive committee.

Traffic Club of Pittsburgh.

F. A. Ogden, general freight agent of the Jones & Laughlin Steel Company, Pittsburgh, Pa., has been made president of the Traffic Club of Pittsburgh, succeeding O. M. Ellsworth, general agent of the Rock Island Lines. D. L. Wells, general agent of the Erie at Pittsburgh, has been made secretary, succeeding T. J. Walters, district freight agent of the Baltimore & Ohio.

American Electric Railway Association.

The American Electric Railway Association has published convention bulletin No. 3, giving full information on transportation to the convention, which will be held at Atlantic City, N. J., October 9-13, and telling of the low rates authorized by the steam railway passenger associations. The convention calendar is included.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.
AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.
AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.
AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.
AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, 1911, Atlantic City, N. J.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; November 15, 1911, Chicago.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.
AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.
GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.
INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.
MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.
OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling; September 10, 1912, Buffalo, N. Y.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.
SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.
WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The report of the Department of Agriculture for September 1 shows the condition of the corn crop on that date as 70.3; wheat, 68.8; oats, 64.5, and apples, 56.2. The changes from the estimates of August 1 are slight.

Press despatches announce that the trans-Atlantic steamship lines have made an increase of 10 per cent. in rates on freight, with a view to offsetting the loss suffered by reason of the recent strikes in England; and also an advance of $1.25 has been made in the third class passenger rates.

Brigadier-General Mills of the United States Army, reports to the War Department that on the occasion of the instruction manoeuvers of the army held at Chickamauga Park last year, a regiment from North Carolina and one from South Carolina were delayed in reaching the camp by reason of the law of South Carolina prohibiting the running of special trains on Sunday; and he says that this incident raises a grave question which ought to be settled.

The Pullman company has issued a revised tariff for seats in parlor cars between Trenton, N. J. and Long Branch and intermediate points, satisfying the complaint which led to the recent investigation by the Public Utilities Commission of New Jersey. It appears that the original complainant was the governor of the state. On some of his trips to the sea coast he had ridden to stations which were not mentioned in the tariff and the conductors had exercised their own judgment as to the amount to be collected; and then when a new tariff was issued he had to pay 40 cents where he had been paying but 25.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 101-B, giving a summary of car shortages and surpluses by groups from May 25, 1910, to August 30, 1911, says:

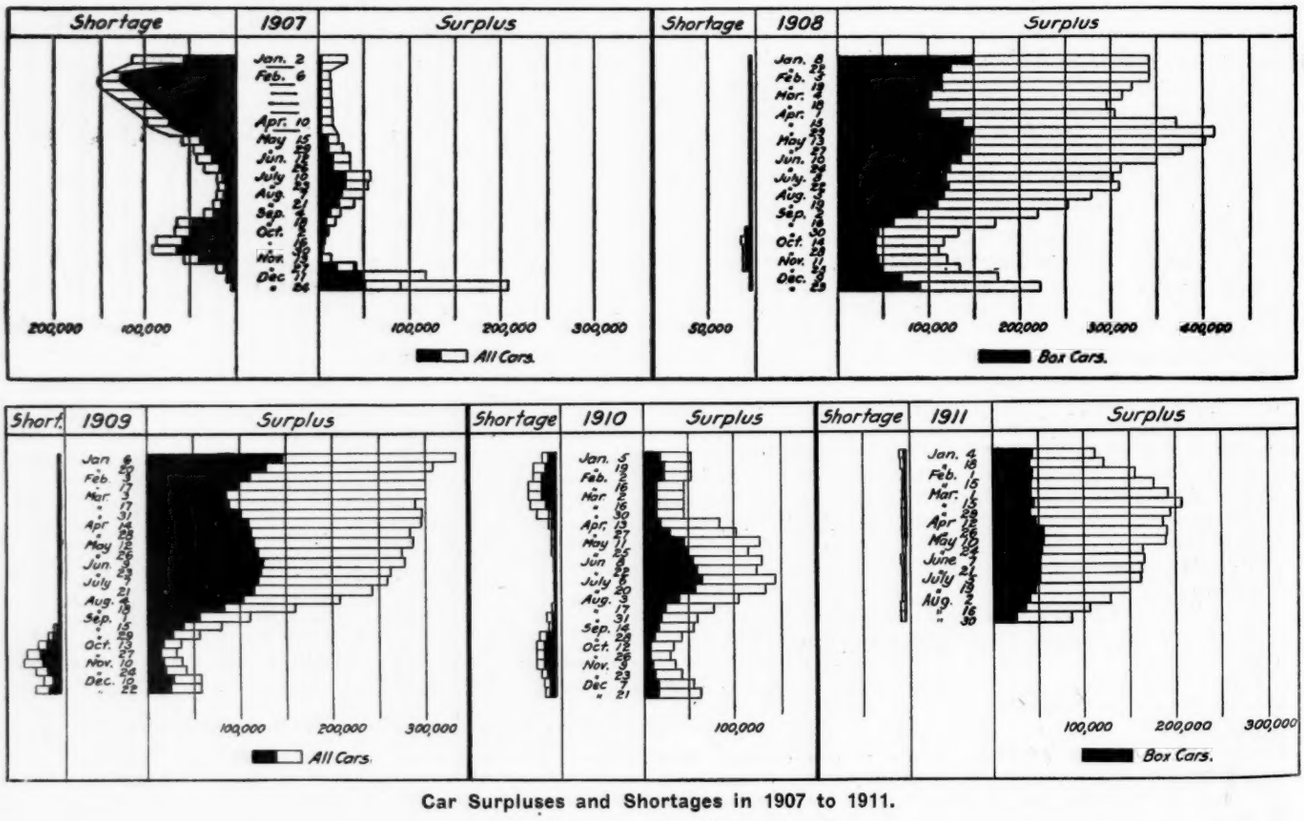
"There is a continued decrease in the surplus of all classes of cars, the total decrease being 19,134 cars, which brings the total surplus down to 88,866 cars. The principal decrease is in box cars, the total box car decrease being 9,804 cars. Coal cars show a decrease of 4,941 cars and flat and miscellaneous cars decreased 4,389 cars. Most of the box car decrease is in group 6, which includes Illinois, Iowa, Wisconsin, Minnesota and the Dakotas.

"There is a slight increase in the shortage of cars, the total shortage being 4,325 cars, of which 2,743 cars are box cars, the

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1—August 30, 1911	7	345	514	1,716	411	2,986	585	101	450	0	1,136
" 2.— " 30, 1911	25	1,795	77	8,760	2,928	13,560	234	2	262	5	503
" 3.— " 30, 1911	26	2,916	263	9,460	3,282	15,921	122	80	7	65	274
" 4.— " 30, 1911	10	1,464	80	322	1,092	2,958	15	139	200	0	354
" 5.— " 30, 1911	17	1,208	75	1,578	1,215	4,076	30	10	0	0	40
" 6.— " 30, 1911	23	8,750	634	2,058	4,933	16,375	15	0	2	2	19
" 7.— " 30, 1911	3	1,219	67	77	436	1,799	0	0	0	0	0
" 8.— " 30, 1911	17	4,591	133	2,060	3,878	10,662	0	0	0	0	0
" 9.— " 30, 1911	12	946	377	353	796	2,472	40	0	0	0	40
" 10.— " 30, 1911	21	3,952	594	2,142	9,053	15,741	224	28	0	0	252
" 11.— " 30, 1911	4	922	20	723	651	2,316	1,478	158	0	71	1,707
Total	165	28,108	2,834	29,249	28,675	88,866	2,743	518	921	143	4,325

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

largest shortage being in Canada and New England. The shortage in coal cars shown by our last report is cut in two."

The accompanying table gives the surpluses and shortages by groups for the last period covered by the report and the chart shows biweekly totals in 1907 to 1911 inclusive:

Biggest and Finest.

Division Passenger Agent Ridgely of the Louisville & Nashville, is making most complete arrangements for the special train to the Negro Baptist convention at Pittsburgh. The train will be made up of three sleepers, two coaches, a diner and a baggage car. It will be the biggest and finest special train for negroes ever sent out of the South.—*New Orleans Picayune.*

Interstate Commission Investigation of Wool Rates.

The Interstate Commerce Commission is making an investigation of wool rates. It grows out of complaints filed by the commercial organizations of Spokane, Wash.; Salt Lake City, Utah; Phœnix, Ariz.; Roswell, N. Mex.; and also by the National Wool Growers' Association, the Oregon Railway Commission and the National Mohair Growers' Association. Commissioner Prouty took testimony in the case at Chicago last week.

J. E. Cosgriff, who grows sheep extensively in Wyoming, Idaho and Montana, was the first witness. He expressed the opinion that the present rates on wool from the western intermountain country are excessive, and said that it costs 17 cents per 100 lbs. to lay down clean Idaho and Wyoming wool at Boston, Mass., while the transportation cost of Australian wool to the same place is only 2 cents. He claimed that English and South American wools are laid down at Boston at even less transportation cost than Australian wool. From Rawlins, Wyo., to Boston the rate is $2.04, being made up of $1.54 to Chicago plus 50 cents beyond. He alleged both parts of the rate are excessive. It developed that the cost of transportation from Australia which had been mentioned was merely the water rate, and the question was raised as to whether there was not an additional rail rate from the Australian interior to the coast. It was admitted that this might be the case, but it was contended that most Australian wool is grown near the coast. Charles Donnelly, assistant general counsel of the Northern Pacific, asked if the establishment of a baling-in-transit rate under which sack wool might move from the ranch to nearby concentrating points and be there compressed and shipped on to destination at the through rate from the point of origin to destination, plus a reasonable charge for the transit privilege, would be of advantage, and the witness thought it would. He would not acknowledge the fairness of charging a higher rate from intermountain points to Boston than from Portland, Ore., because of water competition at the last named point. Commissioner Prouty asked that particular attention be paid by both the railways and the shippers to the question of whether, in view of the heavier loading of wool compressed into bales, it would not be justifiable and expedient to charge a lower rate per 100 lbs. on it than on sack wool.

W. Anderson, of Seattle, said the cost of production of wool has increased from 80 to 100 per cent. within the last few years. The withdrawal of land from free grazing had been a large item in this increase, and the cost of labor and supplies had also advanced. P. G. Johnson, a member of the state legislature of Idaho and a ship grower, blamed the "tariff tinkers" for the general unrest in the wool business. He believed that a reasonable rate from the intermountain points to Boston would be $1.66½, made up of a rate of $1.20 to Chicago and 46½ cents beyond.

J. A. Munroe, freight traffic manager of the Union Pacific, said that in 1896 the wool industry was in a precarious condition, and the Harriman Lines were asked to help the growers. After investigation it was decided to give the territory from central Wyoming and Nevada and to the southern boundary of Utah a rate to Boston of 2 cents per pound, and the eastern lines accepted 44½ cents for the haul from the Mississippi river. Later when wool increased very substantially in value the eastern lines advanced their part of the rate to 57½ cents, making the present rate to Boston of $2.13. The western lines have continued to accept the same revenue as they did before. He said that the Union Pacific considers wool as merely a part of the general sheep industry. In the upbuilding of that industry thousands of dollars have been invested in double deck cars which are idle eight months out of the year. Expedition has been given even in the return of empties and rates on supplies to the sheep ranches have been reduced. From the Pacific coast to Boston the rate on baled wool is $1.00. This, it was contended, is a water-compelled rate. The steamer rate is said to have been as low as 40 cents from Portland to Boston. Going into the interior, rates have been based on a combination of this terminal rate plus the local rate to the coast. The $2.13 rate applies on a territory about 1,000 miles wide. Mr. Munroe gave it as his personal opinion that if compression of wool could increase the loading 33⅓ per cent., the rate per 100 lbs. should be decreased about 12½ per cent. He contended that when wool advanced in price the railways were justified in sharing the increased prosperity of the shippers for the same reason that when the price declined the roads reduced their rate. He thought that the sheep and wool rates should be considered together, and that an increase in the rates on sheep should be followed by a decrease in the rates on wool, so that the railway revenue on the entire product would be the same.

F. C. Dillard, commerce counsel of the Harriman Lines had read into the record statements from the first annual report of the National Wool Warehouse & Storage Company, showing that its stock was to be sold at a premium of 50 per cent., and that its earnings were good. He testified that it was his understanding that this concern had made 20 per cent. net annually in recent years. F. H. Plaisted, assistant general freight agent of the Oregon Short Line, believed the establishment of fourth class rates on wool in carloads would curtail the carriers' revenues. Commissioner Prouty asked why if a Utah cannery was given as low a rate as an interior California establishment in the same business, the Utah wool growers should not be given the same rates as the interior California ranch. Mr. Plaisted answered that the canned goods met unlimited competition in a limited territory, while the wool moved largely to one market against foreign competition, and that the difference between the California and intermountain rates did not interfere with the movement of traffic.

F. W. Robinson, general freight agent of the Oregon-Washington Railroad & Navigation Company, said that the steamships are vigorously soliciting wool tonnage, and gave the following figures showing the decline in the eastbound wool tonnage of his road: 1909, 6,695 tons; 1910, 5,028 tons; and 1911, 5,195 tons. In the territory served by his line the charge for baling wool is about 25 cents per 100 lbs. The road maintains baling-in-transit privileges whereby the shipper may send his wool to some baling point and enjoy the through rate from point of origin to final destination.

INTERSTATE COMMERCE COMMISSION.

The commission began hearings on September 12 at Oklahoma City on the readjustment of rates on packing house products on about 140 railways.

The commission has denied the application of the Louisville, Henderson & St. Louis to maintain lower rates on apples from Westpoint, Ky., to Cincinnati, Ohio, than to intermediate points.

The San Joaquin County Table Grape Growers' Association has filed a complaint with the Interstate Commerce Commission against the extra charge for re-icing cars which had been pre-iced. (See August 11, p. 299.)

The commission has still further suspended (until April 28 next) the tariffs filed by a great many railways increasing the minimum charge to be made for shipments of freight which weigh less than 100 lbs. or which, at the tariff, would be charged less than the price for a shipment of 100 lbs. at first class.

The commission has authorized the distribution of an abstract of the statistical matter used in the investigation of the proposed general advances in freight rates last year (which advances were disapproved). These tables, now printed in a 275-page pamphlet, show the operating expenses of the railways in official classification and Western trunk line territory for the ten fiscal years ending June 30, 1901 to 1910, inclusive. Twenty-two of the principal roads are included. The pamphlet gives also financial statistics, mileage, cost of road and equipment, capitalization, revenues, etc.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JULY, 1911.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama Great Southern	309	$211,328	$113,258	$356,344	$45,867	$60,135	$11,424	$114,398	$8,713	$240,537	$115,807	—$667	$14,748	$100,392	$25,033
Alabama & Vicksburg	142	64,083	46,784	121,239	22,424	24,918	3,838	43,051	5,664	99,895	21,344	193	4,600	16,937	—21,043
Atchison, Topeka & Santa Fe	7,612[1]	4,145,772	1,989,247	6,673,906	1,257,402	1,161,964	128,089	2,010,992	146,168	4,704,615	1,969,291	.....	270,446	1,698,845	—484,127
Atlantic Coast Line	4,499	1,456,474	632,644	2,255,014	331,699	380,568	41,109	831,273	72,824	1,657,473	597,541	.....	107,000	490,541	23,125
Baltimore & Ohio—System	4,433	5,475,605	1,400,008	7,321,156	925,274	1,337,511	161,476	2,475,080	176,116	5,075,457	2,245,699	—25,230	240,997	1,979,472	77,006
Baltimore & Ohio Chicago Terminal	77*a*	.....	3,034	123,048	37,331	19,875	793	50,840	4,040	112,879	10,169	904	18,206	—7,132	—19,683
Bangor & Aroostook	627[2]	147,888	56,161	226,991	49,885	32,189	4,497	71,649	15,016	173,236	53,755	.....	9,250	44,505	10,465
Bessemer & Lake Erie	203	858,483	37,504	904,727	82,445	131,785	9,416	193,775	8,515	425,936	478,791	.....	7,000	471,791	39,130
Boston & Maine	2,224*b*	1,960,673	1,553,698	3,817,240	607,418	485,933	44,928	1,671,283	80,983	2,890,545	926,695	22,004	172,236	776,463	—232,732
Buffalo & Susquehanna *R. R.*	265	126,903	9,329	140,820	29,849	27,147	1,484	49,299	7,134	114,913	25,907	.....	2,600	23,307	18,143
Buffalo & Susquehanna *Ry*	91	40,446	11,980	54,557	5,885	28,530	485	21,013	2,735	58,648	—4,091	—10	1,400	—5,501	—35,774
Butte, Anaconda & Pacific	46	72,842	10,666	88,621	8,918	16,616	640	87,649	2,411	66,234	22,387	.....	2,000	20,387	—4,462
Carolina, Clinchfield & Ohio	238	136,008	15,939	157,123	10,969	19,938	5,205	32,490	7,857	76,459	80,664	74	6,000	74,738	46,981
Carolina, Clinchfield & Ohio of S. C.	18	5,663	1,493	7,531	478	86	848	2,335	338	4,085	3,446	.....	500	2,946	813
Central New England	276	196,369	31,646	241,093	36,809	19,153	1,047	65,839	2,710	125,558	115,535	80	9,000	106,615	57,188
Central of New Jersey	671	1,317,294	600,276	2,024,392	206,012	308,411	32,246	601,814	40,286	1,188,769	835,623	94,824	94,034	836,413	146,015
Central Vermont	411	214,361	108,905	351,987	41,386	44,453	7,109	153,376	7,974	254,298	97,689	754	11,750	86,693	32,811
Charleston & Western Carolina	340	93,608	33,411	134,553	29,336	20,909	2,612	46,959	4,026	103,842	30,711	.....	5,000	25,711	14,271
Chesapeake & Ohio Lines	2,241[3]	2,068,228	531,103	2,717,588	339,700	486,442	59,486	804,958	66,694	1,757,281	960,307	1,552	93,100	868,759	—26,530
Chicago & Alton	1,025*c*	828,209	395,901	1,314,900	198,301	182,093	36,584	421,022	32,733	870,733	444,167	—3,017	36,500	404,650	81,876
Chicago & Eastern Illinois	1,275*d*	870,144	264,401	1,226,696	137,567	201,872	30,410	411,740	41,447	823,036	403,660	—2,048	38,500	363,112	35,446
Chicago, Burlington & Quincy	9,074*e*	4,308,418	2,085,814	7,042,050	1,179,300	1,260,463	150,142	2,193,653	194,326	4,977,884	2,064,166	—20,551	264,412	1,779,203	392,446
Chicago & Erie	269	282,236	63,834	384,919	54,271	82,431	20,033	184,943	9,724	351,402	33,517	.....	10,939	22,578	—13,621
Chicago Great Western	1,496	648,779	276,790	1,010,127	109,546	162,270	45,021	407,150	34,004	757,991	252,136	—870	33,037	218,229	17,527
Chicago & Northwestern	7,754[4]	3,694,364	1,862,278	6,118,555	881,151	765,201	122,894	2,380,048	125,586	4,274,880	1,843,675	—507	275,000	1,568,168	—132,282
Chicago, Indiana & Southern	329	240,593	27,213	274,860	50,112	55,940	7,186	110,078	8,822	232,138	42,722	370	13,900	29,192	13,268
Chicago, Milwaukee & Puget Sound	2,085[5]	1,066,018	238,541	1,343,653	77,007	114,036	54,003	461,974	15,639	722,659	620,994	23,087	79,334	564,747	29,910
Chicago, Milwaukee & St. Paul	7,511	3,145,090	1,370,034	5,044,537	766,646	697,747	99,813	2,035,444	90,477	3,690,127	1,354,410	11,523	239,106	1,126,827	—249,004
Chicago, Peoria & St. Louis	255	97,441	35,909	140,112	18,443	25,219	7,562	58,836	5,567	115,627	24,485	.....	4,300	20,185	15,404
Chicago, Rock Island & Gulf	476	144,896	55,410	216,170	35,942	15,775	10,583	77,512	8,960	148,772	67,398	—348	9,502	57,548	19,825
Chicago, Rock Island & Pacific	7,551[6]	2,837,942	1,685,397	4,854,587	828,782	740,222	161,150	1,954,339	139,407	3,823,900	1,030,687	—10,475	206,775	813,437	—238,667
Chicago, Terre Haute & Southeastern	353	119,617	19,758	142,763	23,882	28,559	2,703	41,419	7,307	103,870	38,893	—166	8,700	30,027	—
Chicago, St. Paul, Minneapolis & Omaha	1,743	641,100	423,957	1,150,936	236,500	151,277	28,542	457,274	33,159	906,752	244,184	1,357	60,728	184,813	—125,915
Cincinnati, New Orleans & Texas Pacific	337	563,165	149,044	753,261	74,644	131,622	19,471	222,394	17,179	465,310	287,951	158	21,800	266,309	—4,137
Cincinnati Northern	246	69,865	24,878	101,533	24,854	21,867	2,889	38,058	2,744	90,412	11,121	.....	4,700	6,421	—6,566
Cleveland, Akron & Columbus	360	186,094	74,349	284,133	54,336	50,849	3,729	95,853	5,459	210,226	73,907	.....	16,600	57,307	4,355
Cleveland, Cincinnati, Chic. & St. Louis	2,009[7]	1,608,301	775,236	2,594,186	285,582	347,072	96,610	939,429	57,870	1,726,562	867,623	—2,542	90,000	775,081	560,393
Colorado & Southern	1,194*f*	441,000	170,183	655,249	89,869	127,374	12,320	194,160	21,739	445,462	209,787	—1,455	24,700	183,632	3,165
Colorado Midland	337	103,652	35,307	155,398	25,557	27,372	6,845	62,470	5,270	127,514	27,884	—207	8,000	19,677	7,575
Cumberland Valley	162	166,755	57,767	235,535	44,267	29,063	4,876	72,455	7,186	157,847	77,688	586	5,141	73,133	—28,817
Delaware & Hudson Co.—R. R. Dept.	851[8]	1,362,091	338,369	1,767,439	107,565	237,236	23,252	582,892	45,351	996,296	771,143	536	44,000	727,679	134,490
Delaware, Lackawanna & Western	930	2,104,687	748,439	3,062,893	487,689	462,016	70,219	868,493	61,815	1,950,232	1,112,661	16,880	143,500	986,041	—144,629
Denver & Rio Grande	2,555	1,371,778	520,246	1,977,615	275,939	341,241	61,004	662,678	49,932	1,390,794	586,821	4,622	70,000	521,443	—182,331
Denver, Northwestern & Pacific	214	46,259	62,677	114,101	14,614	15,124	3,221	26,307	2,631	61,897	52,204	.....	3,000	49,204	9,437
Detroit & Mackinac	358	54,470	38,186	99,020	17,063	16,095	3,017	31,808	2,701	70,684	28,336	2,312	8,541	22,107	—12,197
Detroit, Toledo & Irorton	441	103,604	15,513	128,945	29,511	14,523	2,748	61,578	5,729	114,089	14,856	—45	7,528	7,283	6,806
Duluth, South Shore & Atlantic	612	164,002	101,041	280,335	48,563	26,966	11,357	97,806	12,446	197,138	83,197	2,513	18,000	67,710	—33,868
El Paso & Southwestern Co	901	416,895	81,464	527,069	64,677	87,571	12,674	152,158	21,995	339,075	187,994	—1,586	21,076	165,332	—45,912
Elgin, Joliet & Eastern	831[9]	684,358	9	726,050	64,665	129,681	3,820	215,448	15,093	428,707	297,343	.....	16,725	280,618	77,567
Erie	1,995[10]	2,989,090	923,323	4,228,559	520,824	725,430	86,302	1,286,331	83,296	2,702,183	1,526,376	44,347	86,417	1,484,306	133,097
Florida East Coast	583	116,965	82,274	228,685	50,027	50,731	3,755	93,485	18,246	206,243	22,442	.....	15,500	6,942	—2,496
Fort Worth & Denver City	454	205,106	142,829	369,034	28,054	55,192	8,899	113,630	12,243	218,018	151,016	—1,277	12,500	137,239	31,417
Galveston, Harrisburg & San Antonio	1,338	508,655	267,209	826,421	109,652	127,597	27,933	310,229	25,548	600,959	225,462	—5,166	30,442	189,954	76,342
Georgia	307	132,592	78,846	227,202	27,254	39,772	11,038	102,182	7,065	187,311	39,891	.....	2,100	37,791	13,270
Georgia Southern & Florida	395	92,195	73,577	191,400	20,285	35,938	6,470	76,372	8,642	147,707	43,693	.....	9,407	34,286	2,961
Grand Rapids & Indiana	587	198,474	193,271	426,534	44,531	62,205	11,923	175,431	14,337	308,427	118,107	—913	23,010	94,183	39,673
Great Northern	7,344[11]	3,953,820	1,410,258	5,745,918	960,421	641,010	89,780	1,418,306	96,221	3,205,738	2,540,180	14,365	299,674	2,254,871	453,328
Gulf, Colorado & Santa Fe	1,537*g*	520,395	268,511	849,593	205,415	145,816	28,950	335,153	33,682	749,016	100,576	.....	35,761	64,815	—52,327
Hocking Valley	351	476,028	85,800	604,457	103,062	93,330	8,269	171,727	14,977	391,365	213,092	.....	40,415	172,677	55,594
Houston & Texas Central	789	314,041	160,392	509,493	93,948	64,284	18,974	202,383	21,477	401,066	108,427	—1,459	17,834	89,134	—9,992
Houston East & West Texas	190	57,362	32,728	96,269	19,840	11,377	1,794	29,283	3,554	65,848	30,421	.....	3,354	27,067	—13,241
Illinois Central	4,755*h*	3,258,881	1,178,577	5,090,538	781,216	1,098,334	122,802	1,828,665	132,865	3,963,882	1,126,656	—10,734	230,523	885,399	—53,683
Indiana Harbor Belt	108	.....	.....	194,261	20,587	26,281	2,576	89,695	6,529	145,668	48,593	4,209	5,500	47,302	43,454
International & Great Northern	1,159	353,953	197,244	596,580	106,611	97,061	17,588	294,235	23,690	539,185	57,395	—322	20,000	37,073	—49,568
Iowa Central	558	190,601	51,706	256,135	37,235	49,224	7,100	109,838	8,108	211,505	44,630	.....	9,623	35,007	9,050
Kanawha & Michigan	175	238,041	32,842	276,640	38,309	44,855	2,540	81,922	7,532	175,158	101,482	—10	9,058	92,414	7,646
Kansas City Southern	827	517,709	146,415	751,089	77,355	108,635	27,431	276,380	28,872	518,673	232,416	.....	34,612	197,804	—69,650
Lake Erie & Western	886	333,745	95,072	453,932	60,146	63,846	14,180	177,296	11,794	327,262	126,670	.....	19,868	106,802	56,726
Lake Shore & Michigan Southern	1,662	2,421,145	1,181,929	4,121,042	488,205	570,851	99,887	1,230,239	70,214	2,459,397	1,661,645	2,249	135,000	1,528,894	541,483
Lehigh & Hudson River	96	105,261	3,860	111,122	14,540	19,145	1,162	39,069	6,498	80,414	30,708	.....	3,500	27,208	3,238
Long Island	398	240,066	957,136	1,243,364	125,757	101,317	20,680	402,994	20,338	671,086	572,278	98,262	53,553	616,987	44,962
Louisiana & Arkansas	255	77,828	18,386	100,738	25,664	17,931	2,388	29,229	4,520	79,732	21,006	.....	3,250	17,756	—21,639
Louisiana Ry. & Nav. Co	350	102,265	25,318	137,621	18,544	11,853	5,374	51,724	7,562	95,057	42,564	.....	4,600	37,964	23,145
Louisiana Western	207	92,941	56,516	156,488	22,366	27,354	7,199	48,863	6,745	112,527	43,961	679	6,154	38,485	117
Louisville & Nashville	4,644[12]	2,962,046	1,072,471	4,286,748	685,813	795,398	92,198	1,396,805	88,393	3,058,607	1,228,141	—3,320	161,507	1,063,314	154,260
Louisville, Henderson & St. Louis	199	58,757	37,333	102,195	27,877	11,993	4,314	34,146	3,308	81,638	20,557	353	3,000	17,910	—5,650
Maine Central	1,165*i*	460,335	367,390	885,451	202,112	95,030	8,170	313,223	22,539	641,074	244,377	—1,941	41,311	201,124	7,633

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JULY, 1911—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Michigan Central	1,804	1,409,104	763,181	2,390,212	243,880	236,001	80,244	910,362	43,152	1,513,639	876,573	1,512	110,000	768,085	186,133
Midland Valley	323	69,231	35,209	111,632	25,067	21,021	3,401	36,009	5,080	90,578	21,054	.....	5,484	15,570	15,785
Minneapolis & St. Louis	1,027	212,577	119,053	361,311	36,880	48,014	9,750	155,178	11,923	261,745	99,566	95	19,969	79,692	—35,284
Minneapolis, St. Paul & Sault Ste. Marie..	3,769*j*	1,353,831	567,967	2,050,158	232,941	269,202	44,438	663.203	41,253	1,251,037	799,121	17,320	125,715	690,726	—22,177
Missouri, Kansas & Texas	1,740[13]	888,193	383,512	1,370,943	236,200	210,493	32,405	437,815	43,829	960,742	410,201	—2,041	58,500	349,660	92,704
Missouri, Kansas & Texas of Texas....	1,345	355.572	312,606	719,264	225,993	114,178	24,027	429,709	33,239	827,146	—107,882	—3,689	22,500	—134,071	—205,748
Mobile & Ohio	1,114	640,561	126,377	896,703	116,564	159,647	32,747	328,167	30,881	668,006	228,697	—1,629	24,595	202,473	35,963
Monongahela	64	88,282	2,355	91,914	19,582	9,607	218	19,367	1,964	50,738	41,176	.....	1,900	39,276	5,301
Morgan's La & Tex. R. R. & S. S. Co...	404	214,162	106,497	338,638	48,464	51,062	12,982	134,116	12,589	259,213	79,425	—2,812	18,698	57,915	6,031
Nashville, Chattanooga & St. Louis.....	1,255	637,979	266,261	970,505	155,067	174,676	35.402	354,800	24.801	744,745	225,760	—2,167	23,816	199,777	1,689
New Orleans & North Eastern	195	192,052	53,673	265,202	25,507	51,678	9,984	97,406	12,316	196,890	68,312	—278	9,250	58,784	—21,193
New Orleans & Great Northern	282	91,324	31,488	131,704	18,907	17,179	2,656	42,305	6,764	87,811	43,893	—4	2,000	41,889	—21,916
New Orleans, Mobile & Chicago	404	96,704	33,524	140,166	23,746	14,625	2,873	45.226	7,892	94,362	45,804	—54	4,493	41,257	3,518
New Orleans, Texas & Mexico	264	69,898	18,507	95,120	18,040	11,341	3,975	44,905	6,855	84,646	10,474	.....	.....	10,474	9,767
New York Central & Hudson River.....	3,591	4,678,042	3,173,136	8,725,589	1,204,457	1,154,398	224,689	3,062,554	255,330	5,901,428	2,824,161	1,569	414,372	2,411,359	662,129
New York, Chicago & St. Louis	561	694,676	171,255	901,761	130,733	91,449	47,162	358,471	16,574	644,389	257,372	—1,344	39,000	217,028	—4,109
New York, New Haven & Hartford.....	2,091[14]	2,314,405	2,408,312	5,197,708	572,454	583,135	30,506	1,940,013	138,799	3,264,907	1,932,801	115,980	300,000	1,748,781	664
New York, Ontario & Western	565[15]	586,518	302,141	932,512	122,135	152,679	10,030	302,322	15,376	602,542	329,970	4,065	17,917	316,118	—66,648
New York, Philadelphia & Norfolk.....	112	244,835	40,241	306,393	36,124	53,833	4,979	116,783	11,882	723,601	82,792	.....	7,500	75,292	—43,855
New York, Susquehanna & Western....	152	161,624	57,781	245,883	32,931	24,034	1,163	87,597	3,906	149,631	96,252	1,745	11,733	86,264	16,358
Norfolk & Western	2,004[16]	2,550,652	399,494	3,053,712	401,118	584,268	52,147	863,652	57,355	1,958,540	1,095,172	—2,261	115,000	977,911	85,221
Norfolk Southern	607	139,607	87,936	255,052	30,434	30,449	5,314	85,006	13,802	165,004	90,048	1,721	7,500	84,269	3,922
Northern Central	472	682.400	207,729	948,918	127,832	190,745	15,547	479,730	23,699	837,553	111,365	738	40,336	71,767	—42,347
Northern Pacific	6,027[17]	3,220 045	1,667,235	5,232.852	845.417	716.666	99,877	1,581,404	86,134	3,329,498	1,903.354	41,679	261,643	1,683,390	—585,796
Oregon Short Line	1,646*k*	1,124,899	506,882	1,728,005	227,561	160,565	30,144	359,538	35,190	812,998	915,007	—724	77,107	837,176	15,170
Oregon-Washington R. R. & Nav. Co....	1,856	882,381	522,298	1,493,437	219,503	119,159	41,359	475.820	41,496	897,337	596,100	4,815	77,749	523,166	—
Pecos & Northern Texas	296*l*	88,798	26,024	120,749	18,621	26,240	2,976	39,072	4,642	91,551	29,198	.....	3,447	25,751	—16,174
Pennsylvania *Co.*	1,415	3,281,967	805,667	4,428,883	513,343	768,522	69,701	1,424,511	86,113	2,862,189	1,566,694	—4,082	173,949	1,388,663	—27,669
Pennsylvania R. R.	3,978	8,747,796	3,099,729	12,721,057	1,424,999	2,467,493	180,056	4,626,123	337,034	9,035,705	3,685,352	—121,162	605,931	2,958,259	—151,362
Peoria & Eastern	351	176,963	59,479	255,791	44,323	35,332	6,992	104,331	6,618	197,596	58,195	.....	10,500	47,695	4,469
Pere Marquette	2,331	789.935	449.792	1.360 877	170.373	194.046	37,843	590,085	32.597	1,024.944	335.933	—7,010	56,213	272,710	—46.199
Pittsburgh, Cincinnati, Chic. & St. Louis.	1,467	2,153,585	712,463	3,209,997	586,000	640,875	62,644	1,088,175	63,009	2,440,703	769,294	—1,238	128,783	639,273	90,265
Philadelphia, Baltimore & Washington..	713	836,829	620,415	1,613,357	203,379	273,274	28,005	631,735	34,646	1,171,039	442,518	.....	50.697	391,821	—17,526
Pittsburgh & Lake Erie	215[18]	1,194,283	153,256	1,389,945	150,056	132,537	17,821	305,697	24,719	630,830	759,115	—365	30,000	728,750	—93,738
Richmond, Fredericksburg & Potomac...	83	113,794	61,772	200,902	21,054	25,261	3,161	69,011	5,694	124,181	76,721	.....	1,000	75,721	2,769
Rutland	468	160.080	116,591	313,005	44,210	60.068	8,723	116,761	6,504	236,266	76,739	.....	12,703	64,036	22,813
San Antonio & Aransas Pass	727	159,248	115,185	294,872	67,248	39,888	5,474	111,434	9,506	233,550	61.322	.....	11.000	50,322	—15,107
San Pedro, Los Angeles & Salt Lake....	1,113	431,693	253,422	728,769	143.279	148,926	29,812	288,776	17,125	627,918	100,851	—2,506	24,975	73,370	—18,626
Santa Fe, Prescott & Phoenix	364	101,960	37,415	147,750	20,982	14,378	3,813	45,689	5,359	90,221	57,529	.....	4,333	53,196	69
St. Joseph & Grand Island	319	97,329	39,266	148,235	26,785	17,280	5,791	55,635	5,415	110,906	37,329	—80	5,712	31,537	23,475
St. Louis, Brownsville & Mexico	509*m*	85,358	54,605	155,257	33,956	9,701	3,012	58,034	7,937	112,640	42,617	.....	4,500	38,117	33,578
St. Louis Merchants' Bridge Terminal...	9	.....	246	120,470	31,336	8,084	386	67.986	4,461	112,253	8,217	.....	5,700	2,517	—39,404
St. Louis, San Francisco & Texas	243*n*	54,520	29,421	90,359	16,055	24,002	2,609	40,989	4,541	88,196	2,163	.....	1,360	803	—1,281
St. Louis South Western	796*o*	393.555	116,342	536,136	40,151	96,408	23,968	137,016	22,301	319,844	216.292	—778	19.564	195,950	17,573
St. Louis South Western of Texas	703	180,680	85,295	285 090	48,374	71,691	11,489	121,320	15,379	268,253	16,837	—258	10,000	6,579	7,788
Seaboard Air Line	3,046*p*	1,028,638	412,495	1,636,165	246,487	237,422	51,683	583,974	51,947	1,171,513	464,652	150	72,000	392,802	64,741
Southern	7,076[19]	2,869,437	1,532,617	4,797,307	556,679	749,244	134,438	1,698,292	145,533	3,284,186	1,513,121	—1,885	196,774	1,314,462	83,373
Southern Kansas of Texas	124	75,886	15,067	94,850	14,517	18,895	2,754	35,903	4,264	76,333	18,517	.....	1,981	16,536	—256
Southern in Mississippi	280	34,427	33,456	75,525	24,508	8,365	2,042	33,370	3,521	71,806	3,718	.....	5,217	—1,498	3,226
Southern Pacific Co.	6,214*q*	4,172,399	3,044,285	7,731,470	1,067,720	878,624	172,474	2,102,277	212,910	4,434 005	3,297.465	—21,211	301,144	2,975,110	—497,776
Sunset	58	78,968	18,340	100,372	10,090	1,182	27	21,254	264	32,817	67,555	.....	3,106	64,449	3,284
Syracuse, Binghamton & New York	80	44,621	36,427	93,292	18,680	5,804	2,808	28,910	2,260	58,462	34.830	.....	6,220	28,610	—6,276
Tennessee Central	293	91,253	38,796	137,013	21,665	18,028	5,175	46,423	14,884	106,175	30,838	.....	4,212	26,626	—18,134
Terminal R. R. Ass'n of St. Louis.....	35	.....	238	197,324	34,079	25,336	586	68,405	4,877	133,283	64,041	2,596	26.000	40,637	—30,690
Texas & New Orleans	458	185.233	90,812	295,134	51,925	52,603	6,716	108,140	9,051	228,435	66.700	—1,980	12,748	52,472	—10,025
Texas & Pacific	1,884	702,544	344,100	1,115,716	147.897	244.265	21,763	493,102	44,748	951,775	163,941	1,515	38,000	127,456	91,495
Toledo & Ohio Central	440	352,832	62,319	442,587	60.063	57,176	7,421	148.755	8,729	282,144	160,443	—993	20,343	139,107	—49,817
Toledo, Peoria & Western	247	56,366	39,841	102,265	17,963	23,053	2,061	39,610	3,361	86,052	16.213	.....	4,800	11,413	2,514
Toledo, St. Louis & Western	450	268,823	46,446	335,525	46,419	58,771	8,240	113,849	8,150	235.429	100.096	.....	14,500	85.596	—7.553
Trinity & Brazos Valley	462	74,392	37,137	117,213	26,903	25,676	12,163	61,781	9,240	135,763	18,550	.....	3,500	22,050	23,340
Union R. R. of Baltimore	9	92,427	19,460	113,224	7,841	.....	995	5.721	2,350	16,907	96,317	.....	5,923	90,394	—17,570
Union R. R. of Pennsylvania	31	.....	.....	408.941	27,919	88,361	100	132,532	2,327	251,239	157,702	2,799	3,250	157,251	10.833
Union Pacific	3,497[20]	2,511.723	1,038 051	3,927.611	454.113	435.803	119.192	900.430	105 792	2,114 329	1,813 282	241	151.650	1,661,873	—478,768
Vandalia	827	516.023	224,803	836,427	173,271	153,635	29,616	303,762	20,274	680,558	155.869	.....	27.401	128,468	27,148
Vicksburg, Shreveport & Pacific	171	53 404	42.846	105.987	20.528	21.584	3,499	35.512	4,934	86.057	19,930	—921	6,300	12,709	—22.503
Virginia & Southwestern	240[21]	108.874	15.308	128.703	16.182	26.045	1,816	37.646	3.892	85 581	42.622	.....	4 560	38 062	13.630
Virginian	473	309.261	27.473	348.111	39.676	59.554	5,108	84.107	8.105	196 500	151.611	4,262	17.300	138.573	58.918
Wabash	2,514	1,581.556	688.455	2,447.442	310.655	430.496	83,219	930.849	84.878	1,840 047	607.395	357	71.655	536.097	25.987
Washington Southern	35	37.517	32.083	92.805	17.501	12.076	1.286	33.984	2.495	67.342	25.463	.....	3,245	22.218	—14,385
Western Pacific	934	299,603	107 718	420,084	66,129	32,382	29.720	162.080	20.222	310 533	111.551	—2.866	14.350	94.335	—
West Jersey & Seashore	355	162.772	652.177	854.122	70.172	80.432	15.737	269.164	10.692	646.197	407.925	—5.772	23.473	378.680	19.826
Wheeling & Lake Erie	514	513.803	63.749	615.183	74.810	108.425	6.544	194.100	13.946	397.825	217.358	2,377	21.152	198.583	—12.532
Yazoo & Mississippi Valley	1,371	467,455	209,676	730,559	164,054	112,586	15,181	262,878	24,738	579,437	151,122	—286	38,000	112,836	58,830

Miles operated on July 31, 1910—[1] 7,549 miles; [2] 599 miles; [3] 2.223 miles, July 1911 includes C. & O. of Indiana; [4] 7,629 miles; [5] 1,521 miles; [6] 7,395 miles; [7] 1,982 miles; [8] 819 miles; [9] 780 miles; [10] 1,959 miles: [11] 7,274 miles; [12] 4,590 miles; [13] 1,724 miles; [14] 2,040 miles; [15] 545 miles; [16] 1,951 miles; [17] 5,814 miles; [18] 191 miles; [19] 7,050 miles; [20] 3,411 miles; [21] 188 miles. — Indicates Deficits, Losses and Decreases.

Mileage operated on July 31, 1910—*a* 90 miles; *b* 2,242 miles; *c* 998 miles; *d* includes Evansville & Indianapolis for both years; *e* 9,024 miles; *f* 1,248 miles; *g* 1,518 miles; *h* 4,552 miles; *i* 1,179 miles; *j* 3,534 miles; *k* 1,594 miles; *l* 225 miles; *m* 494 miles; *n* 132 miles; *o* 773 miles; *p* 3,027 miles; *q* 6,147 miles. — Indicates Deficits, Losses and Decreases.

The Red River Oil Company and other cotton seed oil companies of Louisiana have complained to the commission against the concentration charge of from one to three cents per 100 lbs. on cotton seed which is now made by the railways and which charge is refunded when the manufactured product is shipped out on the same road on which it was brought in.

The Southwestern Missouri Millers' Club, with headquarters at Joplin, Mo., and composed of millers in southeastern Kansas, southwestern Missouri and northwestern Arkansas has complained to the commission that the rates now charged by the Missouri, Kansas & Texas and connecting railways on grain and its products from those states to points of consumption in Arkansas, Louisiana and other southern destinations, are excessive by at least 5 cents per 100 lbs. It is claimed that mills in southern Iowa, northern Missouri, eastern Kansas and Nebraska, Illinois and eastern Missouri have an undue advantage to that extent over the complainants. The complainants also ask the commission to order the carriers to smooth the sides and floors of cars by removing splinters, loose nails, etc., so as to prevent the tearing of sacks containing grain products. The expenses of doing this amounts to about $1.50 per car, and has been borne by the shipper heretofore, but complainants ask that an allowance be made by railways for this service and that they should receive reparation for what they have expended in this manner during the past two years.

Shipper Granted an Allowance for Drayage Charges Incurred Through the Fault of the Railway.

W. C. Sterling & Son Company v. Michigan Central et al. Opinion by the commission:

The initial carrier misrouted the shipment of which complaint is made. To obtain delivery that was called for in the bill of lading, the consignee drayed the shipment to its plant at its own expense. The case illustrates the hardship that would be imposed on shippers in many instances without fault on their part if shippers could not recover for actual damages by reason of the improper delivery of freight. On the other hand, the commission is not without admonition from past practices of the danger of discrimination if the door be left open for indiscriminate adjustment of claims of this kind without submission of these claims to the commission. The commission on further consideration has reached the conclusion that justice requires the modification of its prior rulings in respect of claims of this character to the extent that where, as in this case, by default of the carrier and without connivance on the part of the shipper, the consignee is put under the necessity of transferring his freight at the point of destination on completion of the delivery to which he is lawfully entitled under the tariffs and routing instructions, the shipper or consignee is entitled to recover damages to the amount of the actual cost to him of such transfer. All claims of this kind now pending before, or that have been refused by, the commission will be reconsidered in accordance with this modified ruling. (21 I. C. C., 451.)

STATE COMMISSIONS.

The Public Utility Commission of New Jersey has begun an investigation of Pullman car rates between Trenton and points on the seashore, which have recently been increased. One hearing has been held.

The Illinois Railway Commission issued an order on September 6, reducing express rates in that state an average of 23 per cent., effective October 1. The order is practically the same as that issued last year, which was enjoined by the federal court on the ground that the commission did not have jurisdiction, except that the minimum charge is not reduced from 25 cents to 20 cents. Merchandise rates per 100 lbs. for distances up to 30 miles are reduced from 50 to 40 cents, and by the establishment of a new graduated scale, general reductions are ordered in rates for all shipments under 100 lbs. At a hearing to be held later the commission will endeavor to establish new express classifications.

A member of the Railroad Commission of Texas, after an inspection of the Missouri, Kansas & Texas lines in that state recommends that the commission issue an order requiring improvements to the property in the coming year as follows: Renewal of ties on the line on basis of not less than 600 a mile, preference to be given San Antonio, Houston and Austin divisions, and line from Smithville to Granger; relay much of main line with 85-lb. rails; relay Dallas branch and line from Smithvile to New Ulm within three years with 85-lb. rails; reenforcement of ballast, Smithville to San Marcos; systematic replacement of woden bridges by permanent work; adoption of uniform standards of construction and methods of work and issue of rules governing maintenance of way department to promote such ends; new station at Temple and extra waiting rooms at Red Oak, and union station at Hillsboro.

The Indiana commission, denying an appeal made by the Vandalia Railroad, has sustained the board of trustees of the town of Lyons in requiring the road to have a flagman at Broad street in that town from 7 a. m. to 9 p. m. every day. The railway company appealed on the ground that the automatic bell at the crossing, which was put in about a year since, at the demand of the town, was sufficient, especially as the town subsequently ordered the speed of all trains limited to 15 miles an hour. The population of the town or village is only 1,200, but the commission, after sending Chairman Wood to examine the ground, finds that, on account of the large farming population around Lyons, the crossing is much more used than is usually the case in so small a town; and two persons have been killed there. Considering these things and also the obstructions to the view, the curves in the railway line, the number of non-stopping trains, the amount of switching, the contiguity of another crossing, and "many other things," the commission concludes that the crossing is especially dangerous. Three hundred children live on one side of the railway, and attend school on the other. The commission puts little faith in the speed limit as an element of safety, as it is the "common experience of all that such orders are not generally effective." The commission listened to the argument that local authorities could easily impose unreasonable burdens on a railway, but it is held unreasonable to think of reversing the expressed will of the people of Lyons merely because it will cost a fraction of the value of a human life annually. Incidentally the commission refers again to the repeated appeals which have been made by it to the legislature to abolish grade crossings. In spite of these appeals, "the policy of the law of Indiana seems to be not to separate grades but to protect the crossings."

COURT NEWS.

The Supreme Court of Massachusetts, in the case of Hooker v. Boston & Maine, has confirmed a verdict of $2,133 damages for the loss of baggage which was destroyed by fire while waiting in the station at the passenger's destination. The court holds that the limitation of such damage to $100 is not binding on the passenger where he was ignorant of its existence and had not assented to it; and this, notwithstanding that the limitation clause appeared in the tariffs of the road which were published and had been filed with the Interstate Commerce Commission.

Judge C. A. Willard of the federal district court at Minneapolis, Minn., on September 6, pending a hearing, enjoined the South Dakota Railway Commission from enforcing lower railway rates in that state as provided for by legislation passed at the last session of the legislature. The Chicago & North Western, which operates 980 miles in South Dakota, submitted a statement through its counsel, showing that the proposed reductions would so seriously affect its earnings as to cause it net losses.

Judge Willard of the federal district court at Minneapolis, Minn., on September 7 declined to enjoin the South Dakota Railway Commission from reducing the rates of Wells, Fargo & Company in that state, on the ground that the evidence submitted by the company failed to show that it was not earning 7 per cent. on the investment which it claims to be its assessable value in South Dakota. In July of this year attorneys for the express company appeared before Judge Willard, asking to be relieved from paying taxes on $171,000, and saying that its assessable property in South Dakota did not exceed $12,000 and that its true valuation was not over $4,000. The fact was brought to the attention of the court when the injunction to restrain enforcement of order for reductions in rates was sought.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

F. W. Russell has been appointed assistant treasurer of the Virginian Railway, with office at Norfolk, Va., succeeding John J. Corell, resigned to go into other business.

Operating Officers.

J. H. Black, superintendent of the Temiskaming & Northern Ontario, at North Bay, Ont., has resigned and his former position has been abolished.

E. E. Backus has been appointed superintendent of telegraph of the El Paso & Southwestern System, with office at El Paso, Tex., succeeding H. W. Cutshall, resigned.

W. A. Ross, trainmaster of the Chesapeake & Ohio, at Ronceverte, W. Va., has been appointed inspector of transportation of the West Virginia General division, with office at Huntington.

John R. Jones, trainmaster of the International & Great Northern, at San Antonio, Tex., has been appointed superintendent, with office at San Antonio, succeeding Homer Eads, resigned. J. L. Otis succeeds Mr. Jones.

C. M. Boswell, whose resignation as superintendent of the Lake Charles & Northern, and general superintendent of the Louisiana & Pacific, with office at De Ridder, La., was announced in these columns last week, has been appointed general manager of the Madeiro-Mamore Railway, with office at Porta Vehlo, Brazil.

Traffic Officers.

Allington Baxter has been appointed a commercial agent of the Southern Railway with office at Washington, D. C.

L. M. Hogsett has been appointed assistant general freight agent of the International & Great Northern, with office at Houston, Tex.

S. M. Spears has been appointed traveling passenger agent of the Illinois Central, with office at Memphis, Tenn., succeeding Owen Durham, resigned.

F. S. Sleight has been appointed soliciting freight agent of the International & Great Northern, with office at Galveston, Tex., succeeding J. Fry, resigned.

J. E. Meroney has been appointed commercial agent of the Trinity & Brazos Valley, with office at Corsicana, Tex., succeeding C. F. Norton, transferred.

Robert Ralston has been appointed soliciting freight agent of the Cincinnati, New Orleans & Texas Pacific, with office at Cincinnati, Ohio, succeeding J. G. Bliss, transferred.

W. B. Courtright, traveling freight agent of the Chicago, Burlington & Quincy at New York City, has been appointed general agent, freight department, with office at Buffalo.

A. C. Valentine, traveling freight agent of the Queen & Crescent at Dallas, Tex., has been appointed traveling freight agent of the Texas & Pacific, with office at Shreveport, La.

J. K. Dirmeyer has been appointed traveling freight agent of the Trinity & Brazos Valley, with office at Dallas, Tex., succeeding J. D. Gowin, resigned to accept service with another company.

H. D. Snepp has been appointed commercial agent of the Wichita Falls & Northwestern, with office at Wichita Falls, Tex., succeeding George L. Moore, resigned to go to the Texas & Pacific.

J. W. O'Brien, traveling passenger agent of the Chicago & Alton and the Toledo, St. Louis & Western at Pittsburgh, Pa., has been appointed traveling passenger agent of the Denver & Rio Grande, with office at Pittsburgh.

George Robertson, commercial agent of the Southern Railway, at Atlanta, Ga., has been appointed commercial agent, at Athens, succeeding Paul Pinkerton, who in turn succeeds Mr. Robertson as commercial agent, at Atlanta.

J. F. Garvin, chief clerk in the freight traffic department of the Missouri, Kansas & Texas at St. Louis, Mo., has been appointed assistant general freight agent of the Missouri, Kansas & Texas of Texas, with office at Dallas, Tex.

E. H. Wilde, chief clerk in the office of the general passenger agent of the Great Northern at St. Paul, Minn., and A. J. Dickinson, assistant chief clerk, have both been appointed assistant general passenger agents, with office at St. Paul.

George A. Walton, general agent in the passenger department of the Canadian Pacific at Spokane, Wash., has been appointed general agent in the passenger department, with office at Chicago, succeeding A. B. Calder, resigned to engage in other business.

J. A. Ritchie, traveling agent of the Chicago & North Western at Cincinnati, Ohio, has been promoted with the same title, and with office at Cincinnati, to succeed A. R. Gould, resigned. A. M. Linz, soliciting freight agent at Cincinnati, succeeds Mr. Ritchie.

V. C. Williams, eastern superintendent of the Star Union Line of the Pennsylvania Railroad, has been apopinted division freight agent of the New Jersey division of the Pennsylvania Railroad, with office at Philadelphia, Pa., succeeding William W. Wimer, deceased.

O. G. Fetter, secretary and chairman of the Cincinnati Freight Bureau, and secretary of the American Association of Railroad Superintendents, with office at Cincinnati, Ohio, has resigned to become president and general manager of the Cincinnati Freight Service Bureau.

Eugene McAuliffe, general fuel agent of the St. Louis & San Francisco, the Chicago & Eastern Illinois and the Evansville & Terre Haute at Chicago, has been appointed general coal agent of all Frisco lines, with office at St. Louis, Mo., instead of general agent as was announced in these columns last week.

G. F. Snow, special agent of the Bangor & Aroostook at Bangor, Me., has been appointed traffic agent, and will have particular charge of locating new industries on the company's lines, and such special freight, passenger and other matters as may be assigned to him from time to time by the vice-president, to whom he will report.

W. P. Warner, assistant general freight and passenger agent of the Chicago, Milwaukee & Puget Sound at Butte, Mont., has been appointed district freight and passenger agent, with office at Portland, Ore., succeeding J. R. Veitch, promoted. A. J. Hillman, traveling freight agent at Tacoma, Wash., has been appointed district freight and passenger agent, with office at Butte, succeeding to the duties of Mr. Warner.

E. F. Feeney, traveling freight agent of the Rock Island Lines at New Orleans, La., has been transferred to Atlanta, Ga., and E. S. Newhauser, also a traveling freight agent at New Orleans, has had his jurisdiction extended over the territory formerly in charge of Mr. Feeney. J. E. LeBlanc, soliciting freight agent at New Orleans, has been appointed a traveling freight agent at that place, and A. N. McCoy succeeds Mr. LeBlanc.

H. A. Cochrane, assistant coal and coke agent of the Baltimore & Ohio, at Cleveland, Ohio, has been promoted to coal freight agent, with office at Baltimore, Md., reporting to H. M. Matthews, general coal and coke agent. C. R. Wright, chief clerk of the coal and coke department, at Pittsburgh, Pa., succeeds Mr. Cochrane. G. B. Keith has been appointed traveling coal freight agent, with office at Baltimore, succeeding J. H. Baker.

Walter Bowles Calloway, whose appointment as general passenger agent of the Baltimore & Ohio Southwestern, and the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio, has been announced in these columns, was born December 28, 1873, at Harrison, Ohio. He was educated in the public schools of Home City, Ohio, and spent a year at Wabash College. He began railway work in September, 1891, with the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, and was with that road until 1898, first in the freight claim department and then in the passenger department. He then went with the Cincinnati, Hamilton & Dayton, where he was consecutively, division clerk in the passenger department, chief rate clerk and advertising agent. In June, 1902, he was appointed assistant general passenger agent of the Cincinnati, Richmond & Muncie at Richmond,

Ind., and the next year was promoted to general passenger agent of the Chicago, Cincinnati & Louisville, successor to the Cincinnati, Richmond & Muncie. In November, 1904, he was made assistant general passenger agent of the Cincinnati, Hamilton & Dayton, and the Chicago, Cincinnati & Louisville, with office at Cincinnati, and in January, 1906, he was promoted to general passenger agent, which position he held until March 21, 1911. The traffic departments of the C. H. & D., and the Baltimore & Ohio Southwestern were consolidated on the latter date, and he was appointed assistant general passenger agent of both roads, from which position he has just been promoted as above noted.

Engineering and Rolling Stock Officers.

F. E. Bates has been appointed assistant superintendent of locomotive fuel service of the St. Louis & San Francisco, with office at Francis, Okla.

T. T. Cloward, foreman of locomotive repairs of the Philadelphia, Baltimore & Washington, at Bay View, Md., has been appointed general foreman of the Wilmington (Del.) machine shops.

J. M. R. Fairbairn, engineer maintenance of way, Eastern lines of the Canadian Pacific, at Montreal, Que., has been appointed assistant chief engineer, Eastern lines, with office at Montreal.

M. A. Baird, supervisor of signals of the Erie Railroad, at Jersey City, N. J., has been appointed general signal inspector, and H. C. Price, foreman of interlocking, succeeds Mr. Baird, with office at Jersey City.

George Seanor, division foreman of the St. Louis & San Francisco at Joplin, Mo., has been appointed general foreman of shops, with office at Sapulpa, Okla., succeeding J. F. Long, promoted. J. Morgan has been appointed assistant to the general foreman of shops at Sapulpa.

F. Ringer, principal assistant engineer of the Missouri, Kansas & Texas at Parsons, Kan., has been appointed assistant chief engineer, with office at St. Louis, Mo., and his former office has been abolished. R. M. Garrett, resident engineer at Sedalia, Mo., has been appointed district engineer, with headquarters at Parsons, and the office of resident engineer at Sedalia has been abolished.

OBITUARY.

George M. Place, secretary and treasurer of the Fonda, Johnstown & Gloversville, died at his home in Gloversville, N. Y., September 12, after a long illness.

W. B. Hixon, superintendent of bridges and buildings of the Delaware, Lackawanna & Western, was found dead in his office in the Lackawanna station at Scranton, Pa., on September 10. He had been shot with a bullet in the right temple and a revolver was lying on the floor. The coroner decided it was a case of suicide. Mr. Hixon was born in July, 1850, at Archer, Harrison county, Ohio, and in 1869 was an apprentice bridge raiser with the American Bridge Company. Since 1877 he has been superintendent of bridges and buildings on various railways. Previous to 1899 he was superintendent of bridges on the Minneapolis & St. Louis, and since that time he has been superintendent of bridges and buildings of the Delaware, Lackawanna & Western.

David Hawksworth, formerly superintendent of motive power of the Burlington & Missouri River, now part of the Chicago, Burlington & Quincy, died on August 25 at his home in Plattsmouth, Neb. Mr. Hawksworth was born in England in 1831, and began railway work in that country. He came to America in 1849, and after working in the machine shops of different railways, he became a machinist for the Burlington in 1859. During the Civil war he was an assistant engineer on a gunboat in the U. S. Navy, and after being mustered out in 1864, returned to the Burlington, at Burlington, Iowa, remaining there until 1875. He then went to Plattsmouth, Neb., as master mechanic, and was appointed superintendent of motive power at the same place in 1888, which position he held until his retirement from active service in 1901.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Chicago, Indianapolis & Louisville is taking prices on 9 mikado locomotives.

The Grand Trunk has ordered 10 switching locomotives from the Lima Locomotive & Machine Company.

The Laramie, Hahn's Peak and Pacific has ordered 2 mikado locomotives from the Baldwin Locomotive Works. The dimensions of the cylinders will be 20 in. x 28 in., the diameter of the driving wheels will be 48 in., and the total weight in working order will be 181,500 lbs. The tractive power will be 35,700 lbs., the water capacity will be 5,500 gal., and the fuel capacity will be 10 tons.

CAR BUILDING.

The Vandalia has ordered 47 steel underframe box cars from the Pressed Steel Car Company.

The North & South Carolina has ordered 2 passenger cars and 2 cabooses from the Pressed Steel Car Company.

The Baltimore & Ohio has ordered 5 well cars from the Cambria Steel Company, and 4 smoking cars from the American Car & Foundry Company.

The Erie has ordered 10 through passenger cars from the Barney & Smith Car Company, and 10 through passengers cars and 25 suburban passenger cars from the Pullman Company.

The St. Louis & San Francisco is said to be in the market for some new passenger equipment. Part of this equipment will be for the Chicago & Eastern Illinois. This item is not confirmed.

The Frisco Refrigerator Line, a subsidiary of the St. Louis & San Francisco (see *Railway Age Gazette* of September 8, page 484) has ordered 2,500 refrigerator cars from the American Car & Foundry Company.

IRON AND STEEL.

The Canadian Government is in the market for 10,000 tons of rails for the Hudson Bay.

The Pennsylvania has ordered 300 tons of structural material from the Pennsylvania Steel Company.

The Boston & Albany has ordered 4,000 tons of structural steel from the Pennsylvania Steel Company.

The Louisiana & Arkansas has ordered 1,600 tons of bridge steel from the McClintic-Marshall Construction Company.

The Philadelphia & Reading has ordered 200 tons of structural material for the new power house at St. Clair, Pa.

The New York, New Haven & Hartford has ordered 200 tons of structural material from the Pennsylvania Steel Company.

The Chicago, Great Western has ordered 310 tons of structural material for the improvements at Oelwein, Ia., from the Vierling Steel Works.

The New York Central is taking prices on about 4,000 tons of steel for two turntables, three deck plate girder bridges and one set of steel viaduct shapes.

General Conditions in Steel.—The large volume of daily orders in the steel industry shows no decrease, even though the railways are only ordering half their normal wants. The Steel Corporation increased its unfilled tonnage by almost 112,000 tons during August, and it is now higher than at any time since July 31, 1910. The immediate future of the industry is uncertain, for a good deal depends on the settlement of the railway troubles and the Moroccan situation. The Steel Corporation is operating at about 75 per cent. of its capacity.

Supply Trade News.

The Delaware & Hudson is taking prices on a number of machine tools.

The Baldwin Locomotive Works, Philadelphia, Pa., is figuring on making additions to its plant at Eddystone, including the construction of a 500-ft. annex to the erection shop.

The Boston Elevated has ordered from the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., 50 quadruple equipments of No. 306 motors with type HL control.

The Baltimore & Ohio, which has let contracts for building machine shops at Hardman, W. Va., and Rowlesburg, will be in the market in a short time for machine tools equipment for them.

Olin A. Stranahan, for a number of years mechanical engineer of Westinghouse, Church, Kerr & Company, New York, and formerly with the British Westinghouse company, died suddenly while undergoing an operation in New York on September 8. Mr. Stranahan was born in 1866. He was a member of the Engineers' Club and the American Society of Mechanical Engineers.

W. G. Hovey, recently with the Hall Signal Company, New York, has taken a position in the railway sales department of the Okonite Company, New York. W. A. Peddle, signal engineer of the Hall company, in charge of estimating and construction, with office at Garwood, N. J., has been transferred to the sales department, with office in New York. H. L. Hollister, engineer for the western district, with office in Chicago, succeeds Mr. Peddle.

The Railway Steel-Spring Company, New York, has closed a deal whereby it will acquire the plant and property of the Inter-Ocean Steel Company, Chicago Heights, Ill. The Inter-Ocean company is a close corporation, organized a few years ago to make car wheels and rims. It has outstanding $2,500,000 stock and $478,000 6 per cent. convertible notes. The stockholders will receive for their holdings from the Railway Steel-Spring Company $125 per share, making the purchase price of the plant, provided the notes are converted, something over $3,500,000. The money required for the purchase will probably be raised by an issue of $3,500,000 bonds.

TRADE PUBLICATIONS.

THROTTLE VALVES.—The Watson-Stillman Company, New York, has issued a small folder enumerating the 16 prime advantages of the Chambers locomotive throttle. Diagrams are included.

NORTHERN PACIFIC.—This company has published a small pamphlet giving the 1910 population of all cities, towns and villages in Minnesota, Montana, Wisconsin, Idaho, North Dakota, Washington and Oregon. The pamphlet includes summaries of the agricultural statistics of these states.

CAR FURNISHINGS.—The Dayton Manufacturing Company, Dayton, Ohio, has published several small illustrated folders describing its Naery door holders, Dayton switch locks, white enameled cast iron cuspidors, Dayton car basket racks and Hart's combined deck-sash ratchets, pivots and stops.

PUMPS.—The American Well Works, Aurora, Ill., has devoted catalog 124 to illustrations and brief descriptions of the standard types of "American" centrifugal pumps. This company has also issued bulletin 122, supplementing the general deep well catalog No. 110 and the general centrifugal catalog No. 117.

ELECTRIC LOCOMOTIVES.—The General Electric Company, Schenectady, N. Y., has published three bulletins on electric locomotives. Bulletin 4829 deals with electric locomotives for industrial railways, bulletin 4852 is devoted to 50-ton electric locomotives for interurban roads and bulletin 4867 describes electric locomotives varying in weight from 22 to 35 tons for switching and light freight service. All these bulletins are illustrated and include tables and diagrams.

Railway Construction.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—The line under construction from Lometa, Tex., west to Eden, about 100 miles, is now in operation to Brady, 66 miles. It is understood that an additional section of 16.2 miles to Melvin will be opened for business this month, and it is expected that the entire line will be finished and ready for business by October 16. (April 14, p. 912.)

BARTLETT WESTERN.—According to press reports, this company has started work on an extension from Jarrell, Tex., west to Florence, 12 miles, and it is expected that the work will be finished by October 1. (June 30, p. 1713.)

BRINSON RAILWAY.—This road has been extended from Sardis, Ga., northwest to Waynesboro, 19 miles.

BRITISH COLUMBIA ELECTRIC.—Construction work will be started soon, it is said, on a line from New Westminster, B. C., to Millside.

BUTLER COUNTY.—This road has been extended form Melville, Mo., to Menorkenut, 10 miles.

BUTTE, BOISE & SAN FRANCISCO.—This company, which was incorporated last year in Montana with $25,000,000 capital, to build from Butte, Mont., southwest through Montana, Idaho, Oregon and California to San Francisco, Cal., is reported to have secured financial backing for the project from English capitalists. An English construction company has been formed, it is said, for the purpose of securing the construction of the line. An advisory board, of which Dr. W. H. Haviland, Butte, Mont., will be a member, will have its headquarters at Butte.

CADDO & CHOCTAW.—See Memphis, Dallas & Gulf.

CALIFORNIA ROADS.—A line will be built from Susanville, Cal., it is said, southeast via Standish, Spoonville and Milford to Doyle, about 50 miles. J. E. Sexton, is interested.

CANADIAN PACIFIC.—The report of this company for the year ended June 30, 1911, shows that the company has 983.3 miles of new line under construction, on which work is now under way, as follows:

Name.	Miles.
Ontario Division.	
Georgian Bay & Seaboard: Coldwater to Bethany	74.7
South Ontario & Pacific: Guelph Junction to Hamilton	16.2
Manitoba Division.	
Virden branch: Virden, northwest to Macauley	33.4
Souris branch extension: Tilston, westerly to Alida	24.2
Saskatchewan Division.	
Moose Jaw branch: Moose Jaw, southwesterly	35.0
Outlook to Kerrobert	102.4
Kerrobert branch: Kerrobert, northeast	25.0
Weyburn branch: Forward, westerly	46.0
Estevan branch: Estevan to Forward	55.0
Bulyea branch: Craven to Bulyea	21.0
Colonsay branch: Regina to Colonsay	133.1
Swift Current branch, southeasterly	45.0
Wilkie branch: Wilkie, southeast to Anglia	31.0
Wilkie, northwest	32.0
Alberta Division.	
Kininvie branch: Irricana, east	36.7
Bassano line: Bassano, northwest to junction with Kininvie line	35.5
Swift Current branch, northwest	35.0
Crow's Nest Pass line: Kipp branch, Carmangay, northwest to Aldersyde	56.3
Waldo branch: Galloway to Waldo	13.4
Calgary & Edmonton: Lacombe branch, Castor, east	60.0
British Columbia Division.	
Three Forks to White Water	3.5
Kootenay Central: Golden, south	42.0
Wardner, north	24.9
Total	983.3

By the construction of a 16.2 mile line between Hamilton, Ont., and Guelph Junction, the distance from Hamilton to points in western Ontario will be shortened, and an agreement has been made with the South Ontario Pacific Railway for the construction of the line and for a lease of it when completed. The general improvement work done during the year included enlarging terminal yards and buildings, providing additional shops and machinery, and laying many miles of new passing tracks and extending the telegraph lines. This work was continued during the year, and amounted to $18,000,000. The double-track work between Winnipeg, Man., and Brandon, is nearing com-

pletion, and second-track will probably have to be laid on some portions of the main line between Brandon and Calgary, Alb., in the near future.

An officer writes that grading contracts have been let as follows: Moose Jaw, Sask., southwest, 35 miles; Swift Current, northwest, 35 miles; Swift Current, southeast, 45 miles; Weyburn, westerly, 20 miles, and Jukeson, B. C. to Fort Steele, 25 miles, to Foley Brothers, Welch & Stewart, St. Paul, Minn. Wilkie, Sask., southeast, 25 miles; Wilkie, northwest, 32 miles, and Wilkie, southwest, 25 miles, to Dutton & Timson, Winnipeg, Man. Estevan Sask., northwest, 55 miles, to J. D. McArthur. Golden, B. C., south, 41 miles, and Galloway, B. C., to Baynes Lake, 12 miles, to Janse-McDonald, Vancouver.

Cumberland Railroad.—This road has been extended south via Lunsford and Jones Trestle to Tunnel, 2.6 miles, and a branch has been opened for business from Lunsford to Anchor, 2.7 miles.

Elkin & Allegheny.—An officer writes that work is now under way from Elkin, N. C., northwest towards Sparta. Surveys for the entire line are not yet finished. Grading has been completed on 12 miles to the foot of Blue Ridge mountains, and track laying has been started. No contract will be let for the work. H. G. Chatham, president, Elkin.

Gulf, Colorado & Santa Fe.—The San Saba district of the Southern division has been opened for business from Lometa, Tex., south to Brady, 66 miles.

Gulf, Texas & Western.—An officer writes that this company is planning to begin work soon on the extensions from the western terminus at Seymour, Tex., west towards Lubbock, and from the eastern terminus at Jacksboro, east to Dallas, with a branch south to Fort Worth. The cut and fill work will average about 16,000 cu. yds. a mile. Maximum grades will be 1 per cent., and maximum curvature 5 deg. (April 28, p. 1016.)

Harrisville Southern.—An officer writes that work is to be started at once from Harrisville, W. Va., westerly following the Hughes river, six miles, to Cornwallis, at which point connection is to be made with the Baltimore & Ohio. The work calls for the removal of about 15,000 cu. yds. of rock and 25,000 cu. yds. of shale per mile. Maximum grades will be 1.4 per cent. eastbound, and 1 per cent. westbound, and maximum curvature 16 deg. There will be two steel bridges, 90 ft. and 100 ft. respectively, and about one-half mile of trestle work. The company has taken over the rights and property of the Harrisville & Cornwallis, and will finish the work on this line which was started in 1908. The masonry for bridges and about half the grading work is finished. W. O. Stout, president, and C. A. Kriechbaum, chief engineer, Harrisville.

Harrisville & Cornwallis.—See Harrisville Southern.

Hot Springs, Glenwood & Western.—See Memphis, Dallas & Gulf.

Lehigh Valley.—This company has opened for operation a new branch, known as the South Side Industrial branch, from the main line at Glendon, Pa., on the Lehigh river, to Easton, two miles, with a spur from this line of about .5 miles.

Louisville & Nashville.—The Wasiota & Black Mountain, on the Cumberland Valley division, has been extended from Baxter, Ky., to Harlan, two miles.

Memphis, Dallas & Gulf.—An officer writes that this line is now in operation between Ashdown, Ark., and Pine Bluff on the following sections: From Ashdown, Ark., northeast to Murfreesboro, 41 miles; Roseboro to Cooper, 13 miles; Glenwood to Wiggs, 23 miles; Dalark to Fairview, 17 miles, and from Graysonia to McLeod, 16 miles, a total of 110 miles. The company has recently taken over the Caddo & Choctaw, 12 miles, which will be known as the Roseboro division, and the Hot Springs, Glenwood & Western, 23 miles, to be known as the Hot Springs division. Work is now under way on sections as follows: Murfreesboro to Bear Creek Junction, 18 miles; Roseboro Junction to Glenwood, three miles; Lowenberg to Hot Springs, 13 miles; Brown to one mile east of Shawmut, 12 miles; two miles east of Stephens to Daleville, 21 miles, and Dallark to Pine Bluff, 63 miles, a total of 130 miles. No grading has yet been done between Loewenberg and Hot Springs, or between Dallark and Pine Bluff, but is now under way between Murfreesboro and Bear Creek Junction and between Brown and Arkadelphia. About 10 miles of track has been laid since the first of the year between Shawmut and McLeod. This latter station is midway between Shawmut and Arkadelphia, and is not the station on the Graysonia branch, which is to be abandoned. The contractors now carrying out the work are: T. H. Sater & Brother and W. C. Murphy, both of Murfreesboro; J. Thorn, Graysonia; W. C. Tellar, Leard; C. J. Philpot, Kirby, and W. S. Wilson, Rock Creek. (March 31, p. 814.)

Meridian & Deepwater.—An officer writes that the company is now carrying out construction work with its own men, but that contracts for building the eastern end of the line will be let in October. The plans call for a line from Meridian, Miss., east via Causeyville, Blankstown, Yantley, Ala., and Pennington, to Myrtlewood, on the Louisville & Nashville, about 50 miles. The work calls for handling about 20,000 cu. yds. a mile. Maximum grades will be 1 per cent., and maximum curvature 4 deg. There will be a 400-ft. steel bridge over the Tombigbee river. The line will carry cotton, timber, coal and agricultural products. Under the name of the Meridian & Memphis, a line is to be built from Meridian, northwest via Philadelphia or Union, thence via Carthage and Kosciusko to Winona or Granada, about 100 miles. Surveys are not yet made and contracts will be let after January 1. The work calls for the handling of about 15,000 cu. yds. a mile. Maximum grades will be 1 per cent., and maximum curvature 4 deg. There will be a 300-ft. steel bridge over Pearl river. S. A. Neville is president of both companies, Meridian, and W. C. Stowell, chief engineer, Chicago. (July 28, p. 198.)

Meridian & Memphis.—See Meridian & Deepwater.

Missouri, Kansas & Texas.—See item under State Commissions.

Nashville, Lafayette & Eastern.—Incorporated in Tennessee with $10,000 capital, to build a railway in Macon county, Tenn. The incorporators are: R. L. Morris, W. H. Whorley, J. L. Holland, J. M. Hodges, M. S. Freeman, P. East, J. M. McDonald and S. M. Johnson.

Norfolk & Western.—The report of this company for the year ended June 30, 1911, shows that double-track work is in progress from Vivian, W. Va., 5.03 miles, including four tunnels. This work is expected to be finished about November, 1911. At the Kenova bridge over the Ohio river the grade on the east approach is being reduced from 0.5 per cent. to 0.3 per cent., and the viaduct and bridge will be double-tracked, removing 0.7 miles of gauntlet. This will be finished in 1912, and on completion of this work the company will have in operation between Lamberts Point, Va., and Columbus, Ohio, including as second-track the lines around Petersburg, Va., and Lynchburg and the Big Sandy line, 512.09 miles of double-track main line and 191.67 miles of single-track, including two gauntlets, 0.38 miles and 0.55 miles respectively. The Petersburg Belt Line extends from Poe, Va., to Addison, comprising 8.87 miles of main line, and 1.69 miles of connecting tracks with the Atlantic Coast Line and the Seaboard Air Line, and 4.06 miles of sidings. The main line was put in operation on June 29, 1911. The Dry Fork branch and connections has been extended to Operation No. 4 of the New River & Pocahontas Consolidated Coal Company. The total length in operation is 30.11 miles, and construction work is under way from the present end of track between Canebrake, W. Va., and the Beech Creek branch, on 1.04 miles. Work is also under way on the Beech Creek branch from the connection with the Dry Fork branch to a junction with the Indian Creek branch at the Virginia state line, 1.56 miles, and on the Indian Creek branch, from its junction with the Beech Creek branch at the West Virginia state line, to Cedar Bluff, Va., 12.22 miles, and Y connection 0.37 miles at Cedar Bluff. All this work is expected to be finished in 1912 and will complete a connection with the main line at Iaeger, W. Va., and the Clinch Valley district at Cedar Bluff, Va. Work is now under way on the North Fork branch of Tug Fork branch, from Jeanette, W. Va., 4.31 miles, and work has been finished on the Sycamore branch from a point 2.8 miles east of Williamson, W. Va., up Sycamore creek to the coal operation of the Sycamore Coal Company, 2.69 miles. The Winston-Salem Southbound has been finished from Winston-Salem, N. C., south to Wadesboro, 89 miles, where connection is made with the Atlantic Coast Line. This line was built jointly by the Norfolk & Western and the Atlantic Coast Line. Further progress has been made in securing right-of-way for the Guyandot

& Tug River Railroad and connections. The general plans relating to the union passenger station at Norfolk, Va., have been arranged and the Norfolk Terminal Company has entered into operation agreements with the Norfolk & Western, the Virginian Railway and the Norfolk Southern, under which these three companies will use the terminal facilities of the Norfolk Terminal Railway Company in Norfolk. A mortgage has been given by the terminal company to provide funds for the construction of the terminal. Land has been secured for the terminal facilities, and contracts have been let for the station and office building. It is expected that the terminal will be ready for use about the middle of 1912.

NORFOLK TERMINAL COMPANY.—See Norfolk & Western.

PANAMA-DAVID.—Bids for the construction of the line from the city of Panama, in the republic of Panama, west to David, about 361 miles, with branches to the province of Los Santos and the town of Anton, have been rejected, as they did not comply with the specifications. Two weeks were allowed contractors to submit new bids. All the bidders represented American syndicates.

SAN ANTONIO, ROCKPORT & MEXICAN.—Incorporated in Texas with $350,000 capital, and office at San Antonio, Tex., to build from San Antonio, south through Bexar, Atascosa, McMullen, Duval, Starr and Hidalgo counties, to a point on the Rio Grande, about 250 miles, with a diverging line from a point in the southern part of Atascosa county, southerly through McMullen, Live Oak, Bee, San Patricio, Refugio and Arkansas counties to Rockport, thence to Port Aransas, on Harbor island, 110 miles. A. L. Matlock, San Antonio, and residents of that place, are back of the project.

SAN DIEGO & ARIZONA.—A contract is said to have been given to Robert Sherer & Co., to build from Seeley, Cal., west to San Diego, about 80 miles, and work is to be started at once. E. J. Kalbright, chief engineer, Union building, San Diego.

ST. LOUIS SOUTHWESTERN.—This company began operating trains September 3, over the extension from Hamilton, Tex., to Comanche, 25 miles. (July 21, p. 159.)

SEABOARD AIR LINE.—The Dunnellon branch has been extended from Dunnellon, Fla., south to Inverness, 18 miles.

SOUTH CAROLINA WESTERN.—This road has been extended from Darlington, S. C., to Florence, 10 miles.

SOUTH ONTARIO PACIFIC.—See Canadian Pacific.

SPRINGFIELD & SOUTHWESTERN.—Incorporated in Missouri with $2,000,000 capital, to build from Springfield, Mo., west via Paris Springs, to Carthage, about 60 miles. D. H. Mackay, president; L. N. Smith, vice-president; J. P. McCammon, secretary, and J. T. Woodfill, treasurer, all of Springfield.

TERMINAL RAILWAY.—Incorporated at Portland, Ore., with $200,000 capital, to build from Marshfield via North Bend and Empire to Sunset bay. J. W. Bennett, J. H. Flanagan, W. S. Chandler and A. Mereen, are incorporators.

WASIOTA & BLACK MOUNTAIN.—See Louisville & Nashville.

WHEELING & LAKE ERIE.—The report of this company for the year ended June 30, 1911, shows that the improvements which were under way during 1910, including grade reduction work, removal of track from the C. & P. right-of-way bridge renewals, putting up new shops and other structures are about finished. In addition to the bridge work already carried out, contracts have been let for the construction of the piers, the abutments and putting up steel work for bridges, as follows: Over the Sandusky river at Fremont, Ohio, 387 ft. long; over the Huron river at Monroeville, 205 ft.; over the same river at Norwalk, 240 ft., and over the Vermillion river at Clarksfield, 164.9 ft. During the year the rails on 40 miles of track were taken up and used elsewhere as follows: 16.5 track miles between Pittsburgh Junction and Pine Valley, replacing lighter sections, and 12.78 miles on passing tracks, industrial sidings, etc. At Brewster a car repair yard with a capacity of about 100 cars was constructed. There was 7.1 miles of track laid at the Brewster terminal, including shop, car repair and coach tracks. A large amount of track renewal work will probably be carried out during the coming year on the main line and branches on a total of about 195 miles, and some new bridges will be put in to replace the present structures.

WEST VIRGINIA ROADS.—The Kanawha-Ohio Valleys Trade Promoting Co., with general offices at Parkersburg, W. Va., is planning to build about 300 miles of railway lines in West Virginia to be operated by electric and gasolene motor cars. One of the proposed lines run from Charleston, north via Sissonville, Cicerone, Ripley, Sandyville, Parkersburg, thence east to Weston, with a branch from Cicerone, east via Walton to Nicut, and eventually south to Summersville. A number of short branches are proposed west to Poca, Millwood, Ravenswood and Blennerhassett, also north to Boaz, and to Waverly. The plans call for a branch from the Weston line at Troy, south to Glenville, and another branch from the Nicut line at Walton, north to Spencer. A line is also projected from Newmartinsville, east to Hundred. Between Charleston and Parkersburg, 90 miles, there are three divides to cross, involving the piercing of three tunnels. Surveys are to be started about November 1. Kenner B. Stephenson, president, Parkersburg. Colonel A. E. Boone, Zanesville, Ohio, is interested in the project.

WICHITA UNION TERMINAL RAILWAY.—This company has given a mortgage, the proceeds of which are to be used for elevating the tracks for about two miles of four railway companies through the city of Wichita, Kan., and to construct a passenger station on Douglas avenue. There will be a four-track main line, with additional tracks and spurs; and a large amount of new construction will be carried out. The Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the St. Louis & San Francisco, and the Kansas City, Mexico & Orient are interested in the terminal railway.

RAILWAY STRUCTURES.

ANTIOCH, ILL.—The Minneapolis, St. Paul & Sault Ste. Marie has let the contract and started construction on a new passenger station.

ARTESIA, N. MEX.—The Atchison, Topeka & Santa Fe is having plans made, it is said, for putting up a new station at Artesia.

ATCHISON, KAN.—The Atchison, Topeka & Santa Fe has let the contract for building an extension to the present freight house and remodeling and enlarging its freight yard.

AUBURN, WASH.—The Northern Pacific, it is reported, has let a contract amounting to $150,000 for building a 25-stall roundhouse, machine shop and coaling station.

CEMENTON, PA.—See Meshoppen, Pa.

CHILOQUIN, ORE.—The Southern Pacific will build a new station, it is said, at Chiloquin.

FULLERTON, PA.—See Meshoppen, Pa.

GRAFTON, W. VA.—The Baltimore & Ohio is enlarging and remodelling the freight house at Grafton. A second story is being added to the building for the use of the clerical force, and the platforms of the freight building are being lengthened.

HAWKINS, PA.—See Wilmerding, Pa.

HIGH BRIDGE, KY.—The new high bridge of the Cincinnati, New Orleans & Texas Pacific, over the Kentucky river, was put in service September 11. This bridge spans the gorge of the Kentucky river. It is 31 ft. higher than the old bridge it replaces, and is one of the highest railway bridges in the world. The new bridge was built on the same foundation as the old bridge and without interfering with traffic; and, like the old bridge, was erected on the cantilever principle and is of steel throughout, with stone piers. It is 1,230 ft. long and the track level is 308 ft. above low water mark. Over 7,000 tons of steel and 178,500 field rivets were used. The new bridge is designed for double track, and much heavier locomotives can now be used. The increased height is to make easier grades north and south of the bridge. The Queen & Crescent has also been rebuilding 13 light bridges on the line between Danville and Cincinnati. (February 3, p. 261.)

HUACHUCA, ARIZ.—The Southern Pacific, it is said, will build a new station at Huachuca.

KELSO, WASH.—The Northern Pacific has given a contract to

Thomas Brady, St. Paul, Minn., it is said, for putting up a station at Kelso. (March 3, p. 436.)

LEIGHTON, PA.—See Meshoppen, Pa.

LEXINGTON, KY.—The Kentucky Traction & Terminal Company has let contracts for a power house and equipment to cost about $500,000.

MESHOPPEN, PA.—The Lehigh Valley is building three stations of terra cotta construction, at Meshoppen, Fullerton and Cementon. It is probable that similar stations will be built at Trumansburg, N. Y., and at Leighton, Pa.

MEXICO, MO.—The Chicago & Alton has let the contract for building a one-story brick and concrete freight house 28 ft. x 115 ft. The structure will have a cold storage room 10 ft. x 16 ft., a platform scale 5 ft. x 6 ft., a wooden platform 12 ft. x 127 ft., steam heat and electric light.

MOLINE, ILL.—The Chicago, Burlington & Quincy has let the contract for building a one-story brick freight house 50 ft. x 1,200 ft., to cost approximately $20,000.

PASCO, WASH.—The Northern Pacific will soon ask for bids, it is said, for putting up new terminal buildings at Pasco. The estimated cost of the work is $500,000. (July 14, p. 106.)

PORTLAND, ORE.—The Portland Railway & Light Company has let the contract and started construction on its new car plant, where it will build all its own cars in the future. Foundations for the main building are now laid and work is being pushed as rapidly as possible. The plant will cover about 20 acres, and will cost $500,000.

REEDLEY, CAL.—The Atchison, Topeka & Santa Fe Coast Lines has given a contract to Sharp & Fellows, Los Angeles, for putting up a concrete and steel bridge over Kings river at Reedley. The bridge is to be 680 ft. long and will have two truss spans, each 175 ft.; three girder spans, each 100 ft., and one girder span, 30 ft. It is understood that the improvements will cost about $160,000. (June 30, p. 1715.)

SAN DIEGO, CAL.—The Atchison, Topeka & Santa Fe Coast Lines has given a contract to Sharp & Fellows, Los Angeles, at about $200,000 for putting up new freight terminals at San Diego.

ST. CLAIR, PA.—The Philadelphia & Reading is reported to have started construction on a new power house.

ST. MARIES, IDAHO.—The Chicago, Milwaukee & Puget Sound will build a roundhouse and repair shops at this place. The contract for grading the yards and building the side tracks has already been let.

SOUTH PASADENA, CAL.—The Pacific Electric will build a new station at South Pasadena, it is said, to cost in the neighborhood of $10,000.

SYCAMORE, ILL.—The Chicago, Great Western, it is reported, will build a reinforced concrete coaling station at Sycamore to cost about $25,000.

TORONTO, ONT.—Contracts have been given to the George A. Fuller Company, New York, to build the new office building for the Canadian Pacific in Toronto, to cost $1,000,000 also for building the new hotel for the Grand Trunk Pacific at Winnipeg, Man., to cost $1,250,000. (August 18, p. 2358; June 3, p. 1675.)

The city of Toronto expects to ask for bids some time this month for constructing a double-track subway about three miles long. G. R. Geary is mayor, Toronto.

TRUMANSBURG, N. Y.—See Meshoppen, Pa.

VANCOUVER, B. C.—The Great Northern has given a contract to W. H. Chase, it is said, for constructing a dock at the foot of Campbell avenue, in Vancouver. (June 23, p. 1675.)

WICHITA, KAN.—See Wichita Union Terminal Railway, under Railway Construction.

WILMERDING, PA.—The Pennsylvania Railroad is putting in new concrete and steel overhead bridges at Wilmerding and at Hawkins, on the Pittsburgh division, to replace the present structures.

WINNIPEG, MAN.—See Toronto, Ont.

Railway Financial News.

DENVER & RIO GRANDE.—See comment on the annual report of this company elsewhere in this issue.

EAGLE'S MERE RAILROAD.—This property has been bought at foreclosure sale by the bondholders' committee for $20,000. This narrow gage road runs from Sonestown, Pa., to Eagle's Mere Park, 10 miles. (April 28, page 1017.)

FLORIDA EAST COAST.—This company has declared a dividend of 4 per cent. on its general mortgage income bonds. This is an advance of one-half of one per cent. over the dividend declared in 1910.

GRAND TRUNK PACIFIC.—This company has sold privately in London an additional $3,000,000 of its 4 per cent. debentures.

INTERNATIONAL & GREAT NORTHERN.—The Texas Railroad Commission has suspended all negotiations with the International & Great Northern in regard to a revaluation of the property until the road has been discharged from receivership. It is understood that this will not affect the commission's decision on the question of authorizing the issue of $11,000,000 5 per cent. bonds.

IOWA CENTRAL.—J. J. Slocum, representing the Russel Sage estate, has been elected a director, succeeding Charles W. Osborn, resigned.

See also Minneapolis & St. Louis.

MINNEAPOLIS & ST. LOUIS.—Plans are under way for the leasing of the Iowa Central. (August 18, page 358.)

NATIONAL RAILWAYS OF MEXICO.—Many papers of late have printed articles tending to show that the stock control of the National Railways of Mexico had passed from the Mexican government to certain banking houses in New York. An executive officer of the National Railways has made the following statement to the *Railway Age Gazette:* "Control of the National Railways of Mexico is now where it was when the merger of the Mexican Central and the National Railroad of Mexico was completed, namely, in the hands of the Mexican government. There is no move on foot of any nature to endeavor to have control passed to any group of New York bankers or to any financial interests elsewhere. English papers of late have intimated that railway conditions in Mexico are growing more serious each day. This is entirely erroneous. Conditions of the railways in Mexico are growing better each day, and so far as the National Railways of Mexico is concerned, this is strikingly borne out by the fact that since the revolution ended in May, there has been a rapid recovery in earnings of the company. In June, the month after the revolution was settled, earnings for this company showed a decrease of 2 per cent. from June of the preceding year. In July, earnings showed an increase over the previous July of almost 1 per cent., and in August of 3 per cent. over the corresponding month the year before. It should also be noted that earnings in July and in August a year ago were over $6,000,000 Mexican currency ($3,000,000 gold) each month, and these large figures were exceeded in July and August this year. At the present time the political situation is clearing itself rapidly and prospects for good earnings for railways are very bright."

NEW YORK & HARLEM.—A semi-annual dividend of 2 per cent. has been declared on the stock of the New York & Harlem out of the money received as the rental from the receivers of the Metropolitan Street Railway, which leases the street railway property of the New York & Harlem. This dividend is an increase of 1 per cent. per annum, and puts the rental on the same basis that prevailed prior to the franchise tax litigation.

WESTERN PACIFIC.—See comment on the annual report of this company elsewhere in this issue, also earnings and expense table for July earnings.

WICHITA UNION TERMINAL.—William A. Read & Company, New York, have bought the $2,500,000 30-year 4½ per cent. gold bonds of this company. They are guaranteed jointly and severally by the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the St. Louis & San Francisco and the Kansas City, Mexico & Orient. The proceeds are to be used for track elevation of the four roads in Wichita, Kans., and for a union passenger station.